ATI Radeon 9800 Pro ■ NVIDIA GeForce FX 5800 Ultra ■ $22,000+ System Featured Inside!

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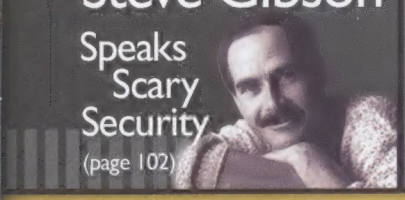
* Steve Gibson Speaks Scary Security (page 102)



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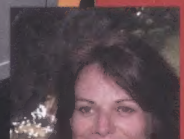
May 2003 • Vol 3 Issue 5

3 power-packed PCs

Spotlight

Frontside

The Experts



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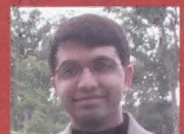

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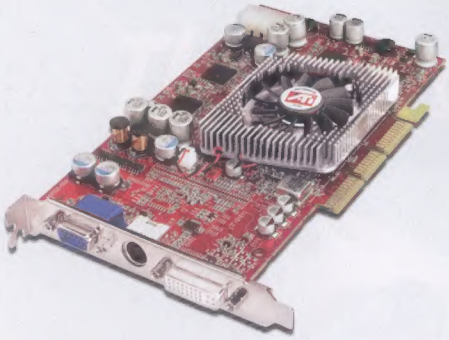
Did you find the hidden CPU logo on our cover? Turn the page for the answer.



Heavy Gear

Hard Hat Area

Loading Zone

Caught In The Web

Digital Living

Tips & Tricks

What's Cooking

Back Door

Infinite Loops

Strange stats and other oddball items from computing's periphery

Greetings From Samitland

My wife Julie calls me CPU-Samit. Very odd since last I checked, my name was (and is) Samit (as in "Submit" with a silent "b") and not Samit as in Sam-it. Should we ever run into each other, at least our introductions will be easier. (Alright, I *wish* I were CPU-Samit—built more in the vein of the T2000 from "Terminator 2"—but that's wishful thinking.) Wishful thinking applies directly to our cover story for this issue, too. Do you recall our April 2002 issue: Leaders Of The Pack? Well, here are three strapping new rigs that make those old machines pale in comparison. That may not be surprising, as we all know the breakneck pace at which technology moves forward and what once was is often no longer 12 months later. Check out the Voodoo PC's new guts. Nice, eh? The Alienware has dual-Pentium 4s embedded in a Canterwood-based mobo along with an all-new external shell. Finally, Falcon Northwest surprised us with an HTPC in the $22,000 price range. Chump change for some of you, I'm sure. Wishful thinking is me bringing home that system and telling my wife it cost me a mere $22,000 . . . and then seeing her giggle with glee. Still, these systems should get your hearts thumping. If you can't wait, go ahead—jump to page 45. I won't be offended. If you want to get your hearts thumping in a more anxiety-ridden manner, skip directly to Steve Gibson's interview on page 102. Do not pass go.

Besides our three dreamy PCs we have some good hardware coverage on the latest and greatest from ATI and NVIDIA. You've probably been hearing lots about the Radeon 9800 and the GeForce FX from our previous issues and the Web. Here are our reviews that cut straight to the heart.

No, not done yet, but I'm going to have to take a breath soon. I've been looking for someone to unabashedly write a rumours column since the inception of the mag. Rumours are a lot of fun—after all, if the rumour comes true, I'll say, "I told you so!" in a not very humble way. If it's a complete farce, well hey, I'll humbly bow low and remind you that a rumour is just that: a rumour. Did you ever read the "Cringley Down Under" column in the old *Infoworld* (circa mid-1990s)? I loved that column. What's better than your average rumour? Well, an intelligent rumour makes things all the more entertaining. And that's what we have here. Without further ado, I'd like to introduce Mike Magee from TheInquirer.net. You'll find his column in our "What's Cooking ..." section on page 100. The column is called "Shavings From The Rumour Mill," and I think you'll have a lot of fun reading it.

Phew, that's all folks! See you next month . . .

Samit G. Choudhuri, Publication Editor, *CPU*

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CORRECTIONS

Page 24/April 2003: The D-Link i2eye Videophone actually doesn't tie up your entire phone line, it only decommissions the one phone you have hooked up to the Videophone for any use besides as a videophone.

Gotcha. Here it is.

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* DDR400 recommended memory modules are listed in user's manual & GIGABYTE website

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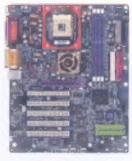

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- Integrated high quality 6-channel AC'97 audio with S/P-DIF function

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GA-8GX "Lab Winner Award" PC Authority Aug. 2002, Australia
GA-8IEXP "Editor's Choice" motherboard.org, website Aug. 2002, U.S.A.
GA-8IEXP "Editor's Choice Gold Award" AnandTech, website Aug. 2002, U.S.A.
GA-8IEXP "Editor's Choice Silver Award" VR-Zone, website Aug. 2002, Singapore
GA-8IXP "Recommended" Dos-V Aug. 2002, Japan
GA-8IEXP "Recommended" Clube do Hardware July 2002, Brazil
GA-8IXP "Editor's Choice" TomsHardware, WWW July 2002, U.S.A./ France
GA-7VRXP "Excellence features" ExtraBrawl, WWW Jun. 2002, U.S.A.
GA-8SRX "Best SiS 645 board" Prohardver, WWW Jun. 2002, Hungary
GA-8IRXP "Pc Pro Labs Winner" Pc Pro Jun. 2002, UK

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Compiled by
Kyle Schurman

ViewSonic's smallest projector can fit in the palm of your hand.

Lightweight Projector Shows Its Strength

If you hate giving presentations because your arms are too tired to run the slideshow after lugging the projector into the meeting room, well, maybe you ought to hit the gym or something. But you'll also want to look into the latest projector from ViewSonic: the lightweight PJ250.

The PJ250 weighs only 2.2 pounds, making it ideal for anyone who must travel with a projector. It offers 1,024 x 768 XGA resolution and bright projections using 1,000 lumens. The projector features a 2,000:1 contrast ratio, as well.

The PJ250 measures 2.1 inches high x 8.8 inches wide x 6.9 inches deep, and it can fit in the palm of your hand. It will sell for about $2,200. ▲

Sony To Sell First Blue-Laser DVD

Sony has introduced the world's first DVD recorder that uses a blue-laser light. The BDZ-S77 is slated for an April 10 release in Japan; Sony has yet to announce plans for selling the recorder elsewhere in the world.

Sony's blue-laser DVD recorder will cost about $4,000 initially and will use 23GB Blu-ray discs (about $35 apiece). The discs have enough capacity to hold two hours of high-definition programming.

Most current DVD recorders use a red-laser, which has a longer wavelength than a blue-laser. Sony is a member of the Blu-ray Consortium, a group of companies that has set a standard for blue-laser DVDs. Toshiba is working on a competing blue-laser standard. ▲

Blu-ray Disc

Sony is offering the first hardware designed under the Blu-ray Consortium.

IBM is recalling 56,000 PC monitors because of a risk of overheating and fire. The monitors, manufactured between June and September 1997, are the G51 15-inch CRT and the G51t 15-inch Touch Screen CRT models. Lite-On Technology manufactured the monitors for IBM.

The U.S. Consumer Product Safety Commission announced the recall along with IBM. The safety commission says IBM has received five reports of monitors overheating and smoking, but no injuries have occurred. The monitors contain a coil inside the monitor's horizontal deflection circuit, which is contained on the monitor circuit board, that can fail and overheat, producing smoke and possibly fire.

Look on the back of the monitor at the rear information label to find the model number, which should be just to the right of the IBM logo. You can visit www.ibm.com/pc/g51recall for further information. ▲

Recalled Model Numbers

The affected monitors have the following model numbers:

G51 CRT	-6541-02E	-6541-02N	-6541-02S
G51t Touch Screen CRT	-6541-Q0E	-6541-Q0N	-6541-Q0S

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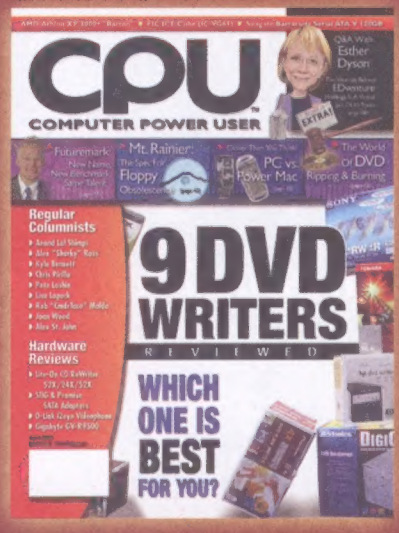

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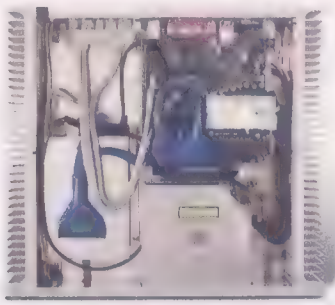
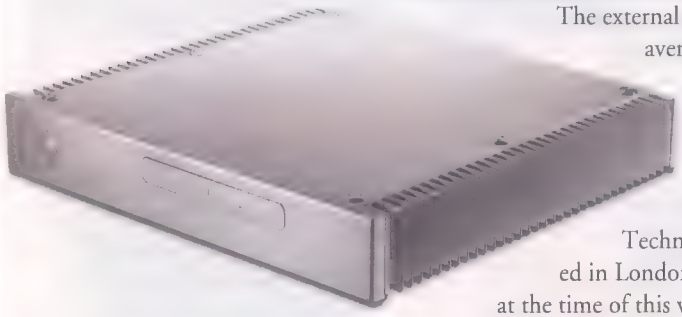
Shhh! Quiet PC Is Worthy Of The Library



Hush Technologies' new product is creating no buzz . . . and that's just how the company wants it. At the recent CeBIT conference in Germany, Hush announced the Mini-ITX PC, which claims to make no noise. Hush has worked with VIA Technologies to create a silent PC that uses an innovative cooling system and fewer moving parts. The CPU and chipset heat sinks are connected to the side of the finned chassis, allowing for passive (and quiet) cooling.



The external case is smaller than the average PC case, too, measuring 2.3 inches high x 14.8 inches wide x 13.6 inches deep. It can accommodate up to a 200GB hard drive, an optical drive, and either SDRAM or DDR memory. Hush Technologies (www.hushtechnologies.net) is located in London. Prices for the Mini-ITX weren't available at the time of this writing. ▲

The Mini-ITX PC from Hush Technologies runs silently.

Hardware Mole

Our endearingly myopic hardware mole always has one ear to the ground. He's [illegible] scuttlebutt [illegible] time.

Toshiba Says, "Bye, Bye Battery"

Toshiba has announced development of a prototype of a direct methanol fuel cell that eventually could replace rechargeable batteries on notebook computers. The fuel cell could run a notebook computer for about five hours on about 50ml of fuel. The fuel cell would be rechargeable and could appear for sale in 2004.

Toshiba overcame a problem with the large size of the fuel cell by storing the methanol at a high concentration, which allowed for a smaller cell size. Toshiba has used the same electrodes found in lithium-ion batteries, letting the fuel cell connect to the notebook as does a lithium-ion battery.

Notebook Storage Hits New Heights

Hitachi and Fujitsu have announced new hard drives for notebook computers that offer capacities of up to 80GB, a 33% increase over the previous largest notebook hard drives. Both companies increased areal density on the drive to increase the available storage space. Hewlett-Packard is expected to make use of Hitachi's Travelstar 80GN in its upcoming Pavilion ze5300 notebook. Dell also has announced plans to incorporate 80GB hard drives in notebook computers. Hitachi and Fujitsu haven't yet announced prices for the new drives.

Bluetooth Phone Connects With MP3 Player

Sony Ericsson will introduce an interesting hardware combination later this year in the form of an MP3 player, the HBM-30, which can connect with your mobile phone. The HBM-30 uses Bluetooth wireless technology to connect with your Bluetooth-enabled mobile phone. You wear the HBM-30 around your neck and listen to your MP3 files through headphones plugged into the device until you receive a call. Then the music mutes, and you can choose to take the call through the Bluetooth connection or restart the music. No price has yet been set for the HBM-30.

The HBM-30 from Sony Ericsson should be available in the United States in the second half of 2003.

Compiled by
Dean Takahashi

To continue the tradition established way back in July 2002, we bring you a page of the choicest chip news. Enjoy!

Nintendo May Opt For 3D Memory Chips

Nintendo invested $15 million in Matrix Semiconductor, a chip maker that is building 3D memory chips. Using technology from LCD manufacturing and a technique for smoothing the surfaces of chips, Matrix has figured out a way to make relatively small chips that can stack layers of transistors vertically. The company figures it can put eight times the memory in the same space as today's memory chips. Shigeru Miyamoto, Nintendo's top game designer, says the chips may be useful in portable game cartridges, which today typically hold about 8MB of data. Nintendo's current chips have to be programmed as much as 10 weeks before they show up in machines on store shelves. But Dan Steere, vice president of marketing at Matrix, says the Matrix chips can be programmed just a few days before they are sold in a product. ▲

The Next GameBoy Advance may use 3D memory from Matrix Semiconductor.

PlayStation 3 Patents Tip Sony's Hand

Sony engineers received a patent in September that shows they're serious about using cell computing, which uses dozens of processors to work on computer tasks, in its next-generation PlayStation 3 video game console. Observers believe that Sony will use 72 processors on a single chip for the main microprocessor of the PS3. Nine of those will be PowerPC control processors, which each control eight-vector processors. The patent also shows that Sony wants to use cell processors in everything from PDAs to large servers. The PDAs might use just one cell of nine processors, while the servers would use something like 16 cells. Last year, Sony's top game technologist, Shinichi Okamoto, promised the machine would hit 1 trillion floating-point operations per second. ▲

Philips Replaces Bar Codes In Clothing

Philips Electronics is planning to embed its I.CODE IC radio chips into apparel manufactured by Benetton, which will use the chips as part of a tracking system that will dispense with bar codes. Unlike bar codes, the radio chips can be updated and track changes in data at any point in the supply chain, and they don't have to be in line of sight for a reader to scan them. The company puts the RF-ID tags, which cost between 5 and 25 cents to make, on clothes labels and boxes during the manufacturing process. The tags emit signals that can be read in warehouses, on palettes, on store shelves, in cash registers, and in dressing rooms. This transmitted data will let Benetton track items anywhere in its stores and throughout its supply chain. Philips said it expects to ship 15 million radio chips to Benetton sometime in 2003. ▲

Watching The Chips Fall

Here's a rundown of the latest AMD and Intel CPU pricing information compared with initial release pricing.

CPU	Released	Original Price	Current Price	Last Month's Price
AMD Athlon XP 1600+	10/09/2001	$160	$48	$44
AMD Athlon XP 1700+	10/09/2001	$190	$53	$48
AMD Athlon XP 1800+	10/09/2001	$252	$62	$63
AMD Athlon XP 1900+	11/05/2001	$269	$69	$71
AMD Athlon XP 2000+	01/07/2002	$339	$77	$76
AMD Athlon XP 2100+	03/13/2002	$420	$89	$86
AMD Athlon XP 2200+	06/10/2002	$241	$102	$108
AMD Athlon XP 2400+	08/21/2002	$193**	$130	$143
AMD Athlon XP 2600+	08/21/2002	$297**	$221	$243
AMD Athlon XP 2700+ 333MHz FSB	11/14/2002	$349**	$262	$269
AMD Athlon XP 2800+ 333MHz FSB	11/14/2002	$397**	$368	$378
AMD Athlon XP 3000+ 333MHz FSB	02/10/2003	$634*	$590	$634*
Intel Pentium 4 1.5GHz	11/20/2000	$819	$111	$111
Intel Pentium 4 1.6GHz	04/23/2001	$294	$125	$114
Intel Pentium 4 1.7GHz	04/23/2001	$352	$124	$123
Intel Pentium 4 1.8GHz	07/02/2001	$562	$130	$135
Intel Pentium 4 1.9GHz	08/27/2001	$375	$145	$145
Intel Pentium 4 2GHz	08/27/2001	$562	$155	$160
Intel Pentium 4 2.2GHz	01/07/2002	$562	$175	$175
Intel Pentium 4. 2.4GHz 400MHz FSB	04/02/2002	$562	$174	$193
Intel Pentium 4 2.5GHz 400MHz FSB	08/26/2002	$243**	$211	$254*
Intel Pentium 4 2.6GHz 400MHz FSB	08/26/2002	$401**	$233*	$295*
Intel Pentium 4 2.26GHz 533MHz FSB	05/06/2002	$423	$168	$198*
Intel Pentium 4 2.4GHz 533MHz FSB	05/06/2002	$562	$162*	$191*
Intel Pentium 4 2.53GHz 533MHz FSB	05/06/2002	$637	$211	$243*
Intel Pentium 4 2.66GHz 533MHz FSB	08/26/2002	$401**	$233*	$289*
Intel Pentium 4 2.8GHz 533MHz FSB	08/26/2002	$508**	$399	$399
Intel Pentium 4 3.06GHz 533MHz FSB	11/14/2002	$658*	$564	$623

* Retail price
** Manufacturer's price per 1,000 units
Other current prices, if indicated, are lowest OEM prices available through Pricegrabber.com

Leaks Give Peek At Next Windows Version

Microsoft recently suffered leaks of two major upcoming products, Microsoft Office 2003 and the next version of the Windows OS, code-named Longhorn.

The Longhorn leak is an early test version of the software, labeled Longhorn Milestone 4. If Microsoft knows the source of the leak, it isn't saying, but the company has admitted that the leaked version is authentic. Analysts say Milestone 4 was more stable than Longhorn Milestone 3, which was leaked late in 2002.

Microsoft suffered a recent leak of the next version of Windows, code named Longhorn. (Yee-ha.)

The leak has revealed some new ideas about the future of Windows. Longhorn will improve the operating system's file management and searching features. Longhorn features improved storage capabilities called WinFS (Windows Future Storage) that will replace NTFS and FAT32. However, many analysts think WinFS will be difficult for Microsoft to implement.

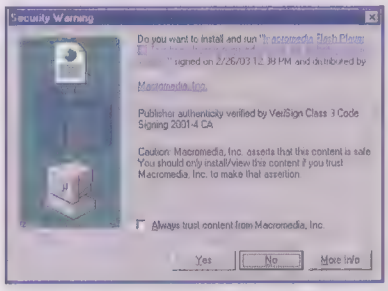
The leak also contains newer versions of Windows Media Player 9 and Internet Explorer 6 than are available for WinXP. You'll also find features, such as Download Manager, improved security, and a Component Wizard (for adding or removing particular features of the OS). Longhorn is slated for a late 2004 or early 2005 release.

The Office 2003 leak occurred when Microsoft inadvertently posted Beta 2 of the software on its developer Web site for about six hours earlier this year. Office 2003 should appear on store shelves this summer. ▲

Software Shorts

Fix Security Hole In A Flash

Macromedia has announced the discovery of a security hole in a recent version of its popular Flash animation player, which the company estimates is installed on 75% of the world's computers. The security hole could let a hacker create a buffer overflow and gain control of the computer. Macromedia has posted a fix inside the latest version of the player available for download from its Web site. The company suggests everyone with the Flash player installed should download and install the latest version (called 6,0,79,0) to avoid any security problems. Visit www.macromedia.com/devnet/security/security_zone/mpsb03-03.html for more information on the security hole and for a link to the download page.



You can download and install the latest version of the Flash player from the Macromedia Web site.

Unix Rights On The Line In $1B Suit

A battle over licensing rights for the Unix operating system has resulted in SCO Group filing a $1 billion lawsuit against IBM. SCO holds the rights to Unix and says IBM has violated its trade secrets by taking ideas from Unix and implementing them in the Linux operating system. SCO also says IBM hasn't followed contracts between the two companies that set up guidelines for IBM's selling its version of Unix, called AIX. SCO says IBM has illegally convinced former SCO Unix customers to switch to AIX. IBM disputes SCO's claims. Market analysts say IBM sold $3.6 billion worth of Unix-based servers in 2002.

CRM Feature Frustrating Some Microsoft Customers

Microsoft's recently released Customer Relationship Management software, called Microsoft CRM, contains a few frustrating features, according to some users. The most problematic feature involves the software inserting a mixture of letters and numbers in the subject line of email messages, which some customers say will confuse the recipients of the messages. Some may think the messages are spam. Microsoft says the set of characters is an identifying number designed to help companies organize and track responses to the messages. Microsoft says it has re-ceived very few complaints concerning the feature, but it will consider changes in the next version of CRM.

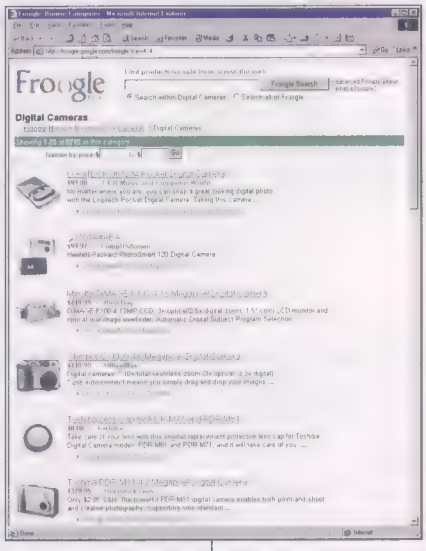
Say It Three Times Fast: Google's Got Froogle

Google, one of the world's most popular search engines, has launched a new service called Froogle (www.froogle.google.com) that applies Google's search technology to finding products that are for sale from stores on the Web. You can use Froogle with a drill-down search or a keyword search.

Froogle, in beta testing at the time of this writing, will make use of many of the features that have made Google popular, including ranking sites only on the relevance to the search terms the user enters; neither Froogle nor Google accept payment for preferred placements within search results. Both sites do accept text advertising for sites related to your search, but those sites are clearly marked on the right side of the page.

During its normal search procedures, Google technology automatically identifies Web pages that have items for sale, and those pages will be passed to Froogle. Froogle also will accept product information that merchants submit electronically to the site. You currently can jump to Froogle from the Google Advanced Search page.

Google also made headlines recently when Disney announced it had chosen Google's Web search technology for use on its various Web sites. Disney's deal with Google came as its contract with Overture Services expired. ▲



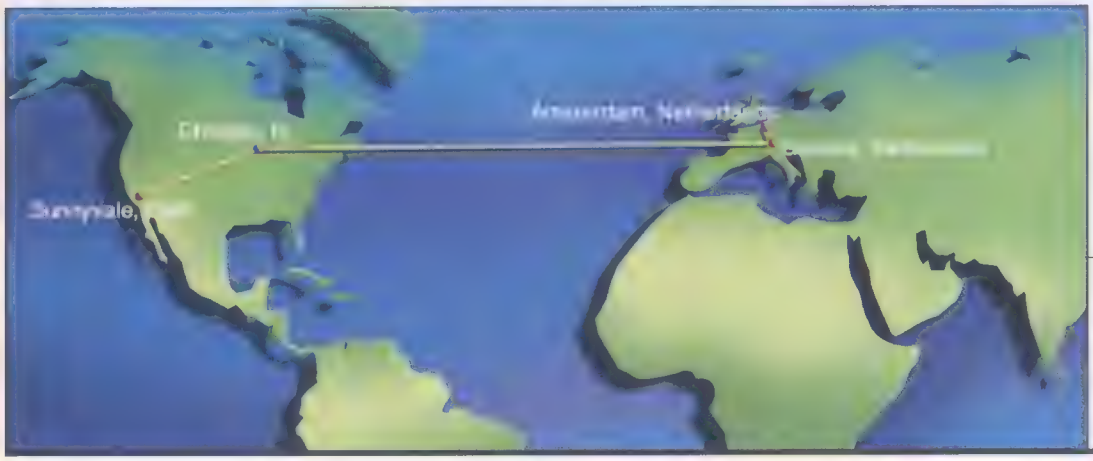
Froogle is a new service from Google that helps visitors find products for sale online.

A Tall Order: Email From Mount Everest

If you're one of those people who has refused to climb Mount Everest because you won't be able to retrieve your email during the trip, help is on the way. A native Sherpa named Tsering Gyalzen has announced plans to set up a cybercafe at a 17,400-foot base camp on the world's tallest mountain. (No word on whether visitors can order a latte while reading email.) Gyalzen says he'll build a temporary structure that would house satellite equipment, radio links, and solar-powered notebooks to carry the Internet data. Gyalzen already has created a cybercafe at a village at 11,280 feet along the Mount Everest trekking route. ▲

'Net Speed Record Approaches 1Gbps

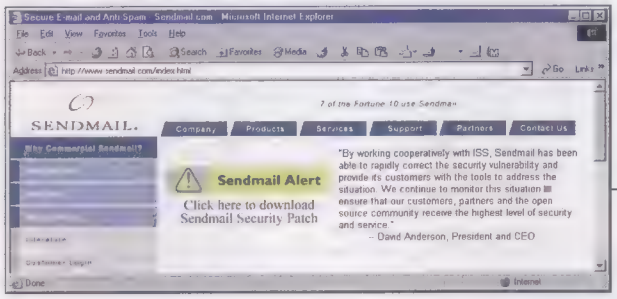
Development of the next version of the Internet—Internet2—continues at a fast clip, although not quite as fast as scientists using Internet2 sent some data recently. Scientists at the Stanford Linear Accelerator Center set a new speed record for transmitting data across the Internet when they sent 6.7GB of data in 58 seconds from Sunnyvale, Calif., to Amsterdam, Netherlands. The data made the trip using fiber-optic cables. More than 200 universities are working together with commercial and governmental entities to develop advanced network applications and technologies for use with Internet2, which will connect research and educational institutions at extremely high transmission speeds. The record-setting transmission was driven in part by the need for particle physicists to transfer vast amounts of data when studying the building blocks of matter. ▲



Stanford scientists sent the equivalent of two DVDs from California to the Netherlands in less than one minute.

Officials Quickly Patch Sendmail Security Hole

Internet Security Systems in Atlanta, the federal Dept. of Homeland Security, and Sendmail worked together recently to correct a serious bug in the Sendmail Mail Transfer Agent software, which handles an estimated 75% of all Internet email traffic on servers worldwide. The security experts were able to develop a patch for the bug and make it available for download at the Sendmail Web site (www.sendmail.com) before the bug became public knowledge and before hackers were able to widely exploit it and gain remote root access to the targeted system. ▲



Sendmail and security experts worked together to head off a potentially dangerous software flaw.

Online Gaming War Moves To European Theater

Flush with better-than-expected successes in the United States, Sony and Microsoft have begun pushing their online gaming platforms in Europe.

Microsoft launched its European Xbox Live service in mid-March after about five months of trials. Sony, meanwhile, was scheduled to start consumer trials of its PS2 broadband network platform in Britain in March and in most of the rest of Western Europe by May. Sony expects to begin online gaming sales in the autumn.

Nintendo says it began online gaming trials in Europe in March but says it will not make a major investment there until more customers have access to broadband Internet access, which is required for the online gaming platforms.

Microsoft is the first game console manufacturer to offer its online gaming platform, Xbox Live, in Europe.

Sony and Microsoft have sold nearly 1 million online gaming kits in the United States thus far, exceeding analysts' expectations. Some estimates say online gaming could account for $1 billion in sales in Europe by 2006.

Sony also recently began providing game developers with the tools and software they'll need to work with the online gaming network from Butterfly.net. Butterfly.net is working with IBM to construct a network that can create a gaming grid with support for at least 1 million users. ▲

New On The 'Net

Looking for some new surfing destinations? Here's a sampler of the many sites that recently hit the Web.

Is It Live, Or Is It ai-buddy?

The recent launch of ai-buddy.com can remove the guilt you feel when you don't have time to converse with your friends over IM. The free ai-buddy service (www.ai-buddy.com) will give you tools that work on your AOL IM (AIM) account while you're away, such as random messages. (AIM is the only IM service ai-buddy will support in its early stages.) When you visit the site, you can sign up for the free service or try a practice conversation with the ai-buddy bot.

Perfect Combo: Geeks & Bling Bling

If you're looking for a serious site devoted to upgrading your computer, www.blingmethod.com isn't it. If you're looking for some of the funniest and strangest ways you can redesign a computer, this is a can't-miss site. You'll see step-by-step instructions and photos for cool ideas such as merging a Furby doll with your computer case (complete with eyes that light up). BlingMethod.com, which is a new domain name supplementing DesignMethod.com, says it is "kickin' it geek style," and we can't argue . . . because we're laughing too hard.

BIOS Upgrades Available Online

Compiled by Marty Sems

Before you send another motherboard to the landfill, consider upgrading the BIOS and giving your PC a new outlook on life. Here are a few recently released upgrades. Subscribers can check out www.cpumag.com/cpumay03/bios to see our entire upgrade list.

Motherboard	File (Date Available)	URL
Abit BH7	bh711.exe (02/21/2003)	fae.abit.com.tw/eng/download/bios/bh7.htm
AOpen AX4B Pro-533	R1.14 (03/07/2003)	club.aopen.com.tw/downloads/default.asp?sel=review&func=review&fun=30
Chaintech 7NJS	3 (02/24/2003)	www.chaintech.com.tw/Downloads/MBBIOS.htm
ECS L7S7A2 PCB 1.1A	02/27/2003 (03/03/03)	www.ecsusa.com/downloads/l7s7a2.html
EPoX EP-8RDA	(03/05/2003)	www.epox.com
Gigabyte GA-8INXP	F4 (03/3/2003)	www.gigabyte.com.tw/Motherboard/Support/BIOS/BIOS_List.htm

Compiled by Steve Smith

Do you ever wonder how the U.S. government snatches all of those al Qaeda email messages and cell phone conversations? Now you can take part in the eavesdropping by joining the spy agency to beat all spy agencies: the NSA (National Security Agency). The NSA is hiring IT pros like nobody's business. Want to develop "advanced communication security and foreign intelligence collection and processing systems"? The NSA needs an experienced computer engineer. Do you have math or computer and code-breaking skills? Your friendly neighborhood NSA recruiter needs computer-savvy intelligence analysts and cryptanalysts. There's even a place for you chronically unemployed humanities majors. "Language Analysts in Amharic, Arabic, Chinese, Dari, Greek, Pashto, Persian-Farsi, Somali, Swahili, Tagalog, Tigrinya, Turkmen, Urdu/Punjabi, and Uzbek have an opportunity to apply their skills in an exciting and important way that they may never have considered," says the job posting at Tech Expo Top Secret, a career site for techies with security clearance.

Raw Data

275,000

Number of Internet users in Uzbekistan (with a population of about 25 million) in 2002, 73% of whom access the Web from Internet cafes in the capital city of Tashkent. This is up from 137,000 in 2001.

WorldITReport

57%

Percent of general advice sites that disclose the sources of their advice.

Consumers International

74%

Percent of U.S. Internet users who support making mass spamming illegal.

Harris Interactive

$75 billion

Estimated cost of damages from computer viruses worldwide in 2007, up from $28 billion this year. The worldwide spending on antivirus solutions is estimated to be $6.1 billion by 2007.

The Radicati Group

Paying For Love

There may be an answer to that persistent and evermore frantic question among Web content providers: What will people pay for online? Apparently they will pay to make contact with one another. The Personals/Dating category became the most successful category of fee-based content in Q3 2002, growing 387% between Q3 2001 and Q3 2002 to net $87 million in revenues, according to the Online Publishers Association and comScore. This means that looking for love finally outstripped looking for money, as the perennial fee-based leader category Business/Investment finally fell to number two, netting only about $72 million in Q3 2002. ▲

Hot Spots

Personals are the new hot category online, accounting for 26.6 million unique users in December 2002. But where are all of those eligible bachelors and bachelorettes hanging out? These were some of the top personals sites in December and the number of unique users they received.

MATCH.COM
5,696,000

YAHOO! PERSONALS
3,958,000

ONE2ONEMATCH
3,474,000

WANTED: Soul Mate

SWM If you like beer-swigging, football-watching, ego-maniacs I'm your type! I want to settle down with a little hottie who'll fetch my grub and go ▮ monster truck rallies with me. #341573

Old Fashioned Love Seeker

SWF What girl couldn't use a man to open her car door or make all the money? #341574

MATCHMAKER SITES
3,205,000

Someone Like Mom

SWM I want someone ▮ take care of me, lay out my clothes in the morning and buy underwear for me. There's room in my heart for you and Mom. #341575

AMERICANSINGLES.COM
3,119,000

ALL MY LOVE TO GIVE

SWM My last girlfriend was psycho and burned my house down. All I have to give is love. #341576

Source: comScore Media Metrix

by Alex St. John

Getting Consoles Online

I was on the Xbox Live Beta. Multiplayer gaming has always been very cool, but being able to reliably talk to other players over the Internet adds a whole new level to the experience. At the same time, it was a tremendous lesson in just how difficult the transition to online gaming will be for game consoles. Making multiplayer games work on the Internet is much more difficult than most people realize. The Internet is a maze of personal firewalls, corporate firewalls, and oddly configured IP addressing provided by major broadband carriers. If you have broadband in your home and share the connection with two or more computers on a hub, odds are you're going to really confuse any game that tries to engage in a peer-to-peer network connection with one of your machines.

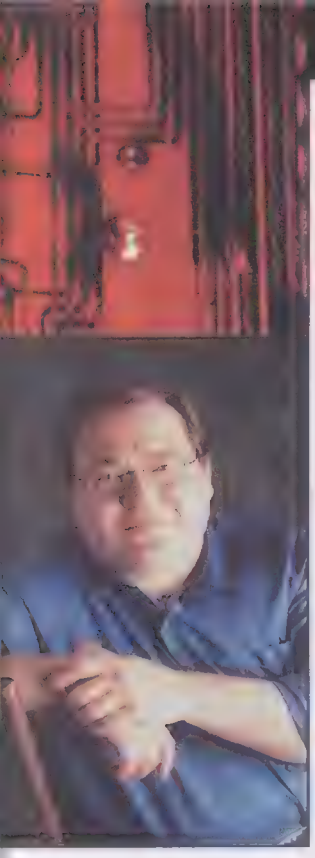
One of the only reliable solutions to making multiplayer games work today on the zoo that is the Internet is to require the game to communicate with a central server. Most firewalls aren't designed to deal with the notion of computers communicating directly with one another very well, but they will often allow a fast communication connection between a personal computer and a server. Thus most games deal with the problem by forcing all real-time gameplay to route through a central server. As most of us online gamers know, Internet latencies can be a big performance issue for gaming, and forcing games to relay real-time communications through a server has the property of doubling whatever latency you might otherwise get from allowing the computers to talk to each other directly. In practice most multiplayer games would probably be much faster and require much less expensive infrastructure to support if they could reliably communicate with other players directly.

Xbox Live actually connects Xbox players peer-to-peer over the Internet. This is a very difficult engineering undertaking, eased only by the fact that Microsoft can tightly control the central lobby server infrastructure and they control the network behavior of every Xbox. To make this work, Microsoft defined their own special gaming protocol for the Xbox that helps it resolve the complex zoo of addressing problems that exist in the plethora of broadband connections people have in their homes. Like other gamers, I'm not sure I like the idea of Microsoft running a closed network for Xbox Live games, but in practice it means that Microsoft can much more reliably ensure fast peer-to-peer connectivity and tight security on the network. This will make it practical for Microsoft to run online contests with really interesting prizes attached to them; plus, it will let them publish content for the Xbox entirely electronically. In the end, a closed network is probably the only way online gaming for the console can work and be commercially viable.

Sony doesn't have as much experience as Microsoft does in dealing with the vast complexities of real-time online gaming; they've left the online architecture open on the PS/2. I don't believe this can last; ultimately Sony will have to move to a closed architecture if it really wants online gaming to mature on the PlayStation. Bringing broadband into the living room is another problem altogether. Today almost everybody who has broadband in their home has it plugged into a PC, and that PC isn't next to the television. Are consumers going to unplug their broadband from the PC and move it to the living room, get two broadband connections, or are they sophisticated enough to know how to set up a home hub? With the exception of the particularly tech-savvy readers of this magazine, most consumers are probably not likely to do any of the above. I suspect wireless solutions will ultimately be critical to getting broadband into the living room. As regular readers of my columns know, I believe that the PC is ultimately the best game machine, so I am challenged with the problem of figuring out how PCs will get in the living room, or, more interestingly, how PCs will stay in the office but their content will reach the living room. Stay tuned; I'll tell you about that experiment next month. ■

… I'm not sure I like the idea of Microsoft running a closed network for Xbox Live games …

Send your feedback to TheSaint@cpumag.com.



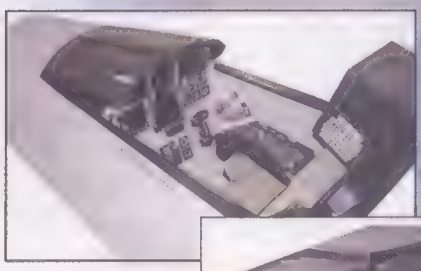
Alex St. John was one of the founding creators of Microsoft's DirectX technology. He is the subject of the book "Renegades Of The Empire" about the creation of DirectX and Chromeffects, an early effort by Microsoft to create a multimedia browser. Today Alex is President and CEO of WildTangent Inc., a technology company devoted to delivering CD-ROM quality entertainment content over the Web.

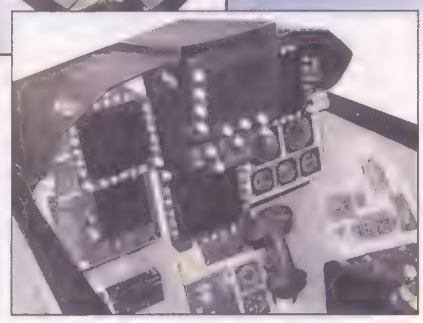
EXTREME HARDWARE

These Gizmos Don't Sing It, They Bring It

Feel the need for speed, Maverick? Fly into the danger zone, which can now be your own basement with a DTS F-18E jet simulator. Of course you can pipe in Kenny Loggins' finest soundtrack tunes from the 1980s with your wireless TerraPlayer MP3 jukebox as you fly the unfriendly skies. It will keep a steady stream of tunes flowing from your Western Digital Raptor Serial ATA hard drive elsewhere in your house, while AccuRain robots keep a steady stream of water flowing to your lawn. Three cheers for more leisure time through technology.

by Marty Sems





DTS F-18E Simulator

Some of us have always wanted our own jet fighter/bombers but were leery of any lengthy inconveniences, such as military service. Fortunately, there's Desk Top Sims (www.dtsims.com). DTS is world famous for turning today's extreme computer hardware into realistic cockpit simulators. This F-18E Simulator isn't a game; it's a sophisticated analogue of a military aircraft, complete with a flight stick and all those buttons they wouldn't let you press in real life. Woohoo! Fill your hangar with a DTSF18CP2 model—fully equipped with a high-fidelity Martin Baker ejection seat (hopefully disabled) and a six-axis 45-degree motion platform—for slightly more than $260,000 delivered. This package includes a 2.66GHz P4 and 1GB of RDRAM, plus a 50-inch Sony plasma display. Check with DTS for more custom-built simulators, such as Formula race cars, Cessnas, and even attack helicopters, such as the Comanche. Turn and burn, Iceman, but don't forget to stay above the hard-deck.

Western Digital Raptor

Serial ATA is further blurring the lines between enterprise and consumer hard drives, a job that parallel ATA started with fast, cheap, and reliable units in ATA servers and RAIDs. Western Digital bends the genres even more with the first 10,000rpm SATA drive. The Raptor 36GB is more of a SCSI drive with a SATA interface than a hopped-up PATA unit, with a 5.2ms advertised average seek time and a five-year warranty (www.westerndigital.com). WD calls it a serial enterprise drive, but if it can eventually manage to perform like one (early reviews, such as AnandTech's, say no), it's going to draw desktop power users like predacious bird-lizards to a staked goat. It's already available for about $160 in nonretail channels at this writing (meaning the Raptor, but probably the goat, too).

Sony SAIT-1

Rip all you want. Download all you want. And you'll wear out the buttons on your digital camera before you'll run out of archival storage space. Sony's new SAIT-1 tape drive can store 500GB natively, which is impressive enough, but its big stick is a bewildering 1.3TB (terabyte; 1,300GB) estimated compressed capacity. That's enough room to capture any problematic programmers in your evil corporation and force them to fight for their lives with glowing Frisbees and jai-alai sets. SAIT is based on helical-scan AME (Advanced Metal Evaporated) tape; the drives come in SCSI or Fibre Channel interfaces. Sony says it expects to ship SAIT-1s in autoloaders and tape libraries and as standalone drives starting at $13,000 by this summer (www.storagebysony.com).

TerraPlayer TR-100

TerraPlayer's TR-100 ($895; www.terraplayer.com) can stream playlists of MP3 files up to 320Kbps from your computer's hard drive, whether you're running Linux, Mac OS X, Unix, or Win98SE/Me/2000/XP. Think of it as a wireless version of the Turtle Beach AudioTron, only with a 640 x 240 color LCD and built-in 6-inch and 2-inch speakers. Besides eye candy, such as album art from Gracenote, the touch-sensitive LCD and its drag-and-drop, customizable icons offer a far more pleasant browsing experience than the AudioTron's dotty readout. The kicker is the wireless scheme, though. Like some cordless phones, the TR-100's included base station uses 900MHz DSS to punch through obstacles further than 802.11b can reach (500 feet) and without interference from your microwave. Updateable firmware hints at future audio format support, too. You can also save a hundred bucks by skipping the speakers with the CR-100 model if you already have a stereo system that won't show up the quality of your music files.

AccuRain

OK, we couldn't resist. How many lawn sprinklers can you really consider "extreme," anyway? (And no, that Willy Waterbug was only extreme when you were six years old.) In short, you set up one or more robotic AccuRain sprinklers in your yard with the usual water pipes, plus an electrical connection. Next, you program them with a portable controller tablet to spray water only within a series of up to 24 points you define on the lawn. Rather than indiscriminately deluging an area with water like a regular sprinkler, an AccuRain robot will raster the defined area with a single stream of water, up to 30 feet in any direction. This lets water soak in without wasting it on your deck or driveway. See? Even your lawn-obsessed, doofus neighbor can go geek ($287 and up; www.accurain.com).


NEC
MultiSync LCD 1850X
XtraView
RESET
OSM

NEC

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Less of your monitor.

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So broaden your horizons. Choose Ambix™ for digital/analog dual input technology that ensures long-term compatibility. XtraView+™ for wide angle viewing. OmniColor™ technology for precise color values. Or LiquidView™ for high-resolution readability. It's innovation that lets you see more of what you want. Less of what you don't.

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NEC ranked as the #1 flat panel monitor branded vendor in the Stanford Resource – iSuppli Flat Panel Monitrak℠ Quarterly Report, Q2 '01. MultiSync is a registered trademark, and Ambix, XtraView+, OmniColor and LiquidView are trademarks of NEC-Mitsubishi Electronics Display of America, Inc.

NEC/MITSUBISHI
NEC-MITSUBISHI ELECTRONICS DISPLAY

UPS Roundup

Power Protection For Power Users

One urban legend states that there is generally a spike in regional birth rates nine months after an extensive power outage. Although there is actually no statistical evidence to support this, we know one thing for certain: When the power cuts out and you're waist-deep in a critical business project, term paper, or championship deathmatch, the words "oh, baby" are probably not your first exclamation of choice.

UPSes (uninterruptible power supplies) tend to get pretty short shrift in the consumer sector. After all, the products have a long history of being expensive and excessive. But now that prices have plummeted, the costs of not having a UPS become more apparent. Think about what you make per hour or, more intangibly, what your family or recreational time is worth. If a power outage nukes two hours of work (we're guessing you weren't backing up every few minutes), you're out the first two hours, another two hours to re-create the lost work, plus the downtime you spend during the blackout twiddling your thumbs. How much would you pay to have half of your day back?

OK, so you're sold on the necessity of a UPS. Now the subject gets more difficult. Power protection is filled with an overwhelming amount of engineering-level minutiae and conflicting information. You may hear salespeople say, "You need line conditioning to protect the longevity of your PC's components." In fact, this is more or less untrue. How large of a unit do you need? What's the difference between a $10 surge strip and a $100 surge protector?

Hold on. We've got answers and a look at some UPSes ideal for power users.

Assessing Your Capacity Needs

You face two key variables when assessing which size of UPS to buy: watts and battery runtime. Now, when you look at a UPS' retail box, you may not get a good idea of either criterion. Most UPSes are rated in VA (volt amps). This practice is so common that most vendors integrate the VA rating into the UPS model name.

Unfortunately, the VA rating doesn't tell you much. What really matters are watts, and the conversion from volt amps to watts is a sticky one. According to Rick Hunteman, vice president of sales and marketing for Para Systems, the conversion depends on a translation factor that can vary from vendor to vendor. For example, APC's Back-UPS ES 725 is a 725VA that handles 450W, a translation factor of roughly 40. Our Belkin unit does 1,200VA with 670W for a factor closer to 45. CyberPower uses an even higher fudge factor: 825VA yielding only 410W for a value of approximately 50. At the other extreme is Para Systems. With a 700VA/500W rating, it has a translation factor of only about 30.

So how many watts do you really need? The common answer is to add up the cumulative wattage of every component that will receive power from the UPS battery. This may require some heavy digging in your component documentation and/or vendors' Web sites. A modern CPU and motherboard alone will consume upwards of 100W. A mid-tower with, say, three PCI cards, three IDE drives, and an inkjet printer might chew through 250W to 300W. Remember that you still have a monitor to accommodate, but we'll ignore that for now.

Theoretically, a 300W UPS should handle your tower, sans monitor and peripherals, but the component vendors may have understated their figures while the UPS vendors may have overstated theirs. So pick your margin of error. A 20% to 25% buffer should be enough. Be sure not to underestimate because if your load exceeds the UPS' capacity, you'll blow the UPS' fuse and negate your whole reason for buying the unit in the first place. Plan for future expansion (perhaps another 25% to 50% over your current load), as well as external devices.

Do not plug your laser printer into the battery backup receptacles, though. Laser printers draw a massive power load during warm-up and printing. If you do need battery power for your laser, anticipate buying at least a 2,000VA UPS.

Next up is battery runtime. All bets are off here. CyberPower, for example, states on its 825VA retail box that a PC with a 15-inch CRT will obtain 45 to 60 minutes of runtime. The spec sheet quotes 25 to 50 minutes. So imagine our surprise when the unit barely topped 11 minutes in our test after charging for 24 hours. APC played a fairer game, quoting its ES 725 at 3.3 minutes under a full 450W load and 11.8 minutes at 225W half-load. (Our test returned 13.2 minutes.)

We can't even draw a price-performance comparison for runtime. If we divide retail price by runtime minutes, Belkin comes in at 5.7 while Tripp Lite yields only 11.3, lower being better. About the only way we found to guesstimate runtime was ye olde lift-and-grunt test. Our Para Systems S 700 weighs in at 42 pounds while the Tripp Lite SMART550USB is but a svelte 14.4 pounds. Divide weight by runtime and you get values of 1.7 and 1.5—about the closest thing to a constant across these variables.

There are several other key UPS points you should consider before buying a UPS for your system. Unfortunately, we didn't have enough room to list them all here, but subscribers can check them all out at www.cpumag.com/cpumay03/ups.

Five Power User UPSes

Here are a few UPSes we think are worth checking into.

APC Back-UPS ES 725

$99.99

www.apc.com

This unit exemplifies why APC remains one of the top names in UPSes. With the lowest price in our roundup, this 450W model still manages to clock in at the center of our group for battery backup time. We were impressed that the ES 725 was the only model we saw that features an easily accessible battery area for hot-swapping of cells, eliminating the need to send the UPS back to the factory someday for a new battery. (The unit ships with the wire lead to the battery disconnected for safety, a provision none of the other vendors apparently find necessary.)

The 16.2-pound ES 725 features eight total receptacles, all of which are surge protected but only four of which link to the battery. APC also throws in surge-protected RJ-45, Ethernet, and coax ports.

APC was also the only vendor we saw that integrated an admittedly overkill USB 2.0 port (cable included) for linking back to the PC for use with its bundled PowerChute Personal Edition software. PowerChute goes a bit beyond the usual shutdown software by offering some additional battery management and periodic UPS component quality checking functions, but realize that the antivirus, firewall, and other included titles are only trial-version.

Overall, we were very pleased with the ES 725 and feel that it's probably the most cost-effective unit in this roundup for moderate-load home desktop users.

Belkin Universal UPS 1200VA

$159.99

www.belkin.com

During this writing, Belkin's Web site noted that "due to the overwhelming popularity of this product, we are temporarily out of stock." (Several online resellers had units on hand.) Even more hyperbolic is Belkin's $500,000 connected equipment warranty. On the other hand, kudos for the 1200VA are definitely due.

First off, Belkin trounced every other player on our backup time test, even handily defeating Para Systems by four

Belkin Universal UPS 1200VA

minutes at only half the price. Four of the unit's six surge-protected receptacles receive battery power, and with 670 watts, you've got plenty of capacity for dual monitors and extra peripherals. For what it's worth, Belkin also tosses in voltage regulation, but a more subtle touch is the inclusion of an RS-232 serial, as well as a USB port for use with the bundled Bulldog Plus software. With both ports, old corporate boxes running NT are covered the same as new legacy-free systems.

Although it does support a more comprehensive set of LED indicators than APC, Belkin omits a coax pass-through and instead only offers protected in/out jacks for RJ11 and RJ45 cabling. Still, considering the lengthy runtime, high load capacity, and surprisingly low price, Belkin's 1200VA stands out as the UPS of choice for power users with fully loaded systems.

CyberPower 825AVR

$129.99

www.cyberpowersystems.com

With an 825VA rating, integrated line conditioning, and a more-than-aggressive price point, we expected to be more impressed with CyberPower's 825AVR. Sure, the unit's output is clean, but we were immediately on alert upon seeing the 825VA only translate into 410W and noticing that only three of the six surge-protected receptacles were for battery use.

We were willing to float the unit a little more slack upon seeing that the 825AVR supports both RS-232 and USB cables for its PowerPanel Plus software. As with the Belkin, CyberPower provides in/out jacks for fax/modem and Ethernet and skips coax. (This should only bother people doing TV tuning or PVR apps on their computers. In the latter case, you're going to want more capacity and battery time, anyway.) Beyond this point, our impression of the unit slid. Battery runtime was subpar for a unit with this VA rating, which, as mentioned, was itself suspect. Furthermore, the 825VA is rated for 1260 joules of surge protection, but we can't help but recall Dr. Richard

Time Tests

For our test, we used a Shuttle XPC running an Athlon 2800+ with two internal hard drives, a DVD-ROM drive, a 15-inch CRT, and one external Maxtor hard drive. To put the system under a fairly rigorous load, we left "Lilo and Stitch" running in the DVD drive, put SiSoft SANDRA 2002 on autopilot cycling through CPU and memory burn-in tests, and kept a constant data transfer passing from the second internal hard drive to the external unit.

APC Back-UPS ES 725	**13:12** (minutes:seconds)
Belkin Universal UPS 1200VA	**28:20**
CyberPower 825AVR	**11:03**
Para Systems SmartSine S 700	**24:10**
Tripp Lite Smart550USB	**9:43**

Cohen's warning about high joule ratings. (See the "A [Surge] Arresting Argument" sidebar.)

The two things the 825AVR has going for it are its low price and its relatively quick eight-hour recharge time. This makes a good UPS for a second PC, perhaps a low-demand network node, but falls short on covering a decently stacked tower.

Para Systems SmartSine S 700
$319

www.minute-manups.com

We offer the SmartSine S 700 here instead of the other unit Para Systems sent us, the MN 525, which would have compared too similarly against APC and CyberPower. The SmartSine is a wholly different beast, featuring a runtime and form factor in league with Belkin but with an otherwise distinct feature set.

The S 700 is a tough sell for home users. As stated earlier, unless you plan on using motorized devices on battery backup, sine wave output is largely unnecessary. Without sine, Para Systems' advantages against Belkin for consumers disappear, and you're left with a 500W UPS that has an RS-232 communication port but no USB. All eight receptacles receive backup power and are both surge-protected and line-conditioned. However, there is no coax or even Ethernet protection. All of this adds up to one significantly overpriced UPS.

For business users, however, the situation may be different. We've already discussed Para's SentryII software, which is optimized for multiple-user scenarios. The SmartSine is also the only UPS we saw that features a rear-mounted expansion slot. The company offers several plug-in cards for functions such as simultaneous shutdown of up to three systems and environmental monitoring for temperature and humidity. So under the right circumstances, a SmartSine unit may be a terrific investment. We just see it as more of a special solution in the medium- to large-scale business markets.

Tripp Lite
SMART550USB
$109.95
www.tripplite.com

With the smallest footprint of any UPS we saw (5 x 6.5 inches), the 14.4-pound SMART550USB shoots for the lower end of the desktop

A (Surge) Arresting Argument

Didn't we say that even power manufacturers disagree on basic sales points? Zero Surge's Rudy Harford and Panamax's vice president of technology, Dr. Richard Cohen, have a healthy respect for one another. (Each independently recommended the other as a reliable technical source.) However, that has not kept the two from voicing their serious differences over the year. Zero Surge is the sole voice behind series mode suppression, which Harford patented, while everybody else in the industry uses MOVs.

In one corner, Harford compares a surge suppressor to car tires, pointing out that MOVs degrade with each surge they sustain. "After you drive so many miles, you have to change your tires. Only with MOV technology, you don't know how many miles you've got on your tires until it fails. There is no indicator of imminent doom. So if you have high surge exposure, an MOV is not the thing to use if your time or the cost of the equipment are important."

A typical MOV suppressor works by diverting excess voltage from hot to ground. Harford criticizes that this leaves all other devices on that branch circuit open to surge damage via the ground line, a condition called ground line contamination. In contrast, series mode technology captures the surge and gradually and harmlessly releases it to the neutral so all other connected equipment is insulated from the surge.

In the other corner, Dr. Cohen comes out swinging with his own one-two blow. He contends that studies show how most power-related component damage stems from an "open neutral," where a wire that should have 120V on it suddenly has anywhere from 30V to 200V. Normally, this is supposed to result in a blown fuse, but some victims aren't so lucky. "Zero Surge does nothing to deal with this," says Cohen. "It has no provision for sustained AC overvoltage."

Furthermore, he calls the comparison of MOVs to brakes that wear down (another Harford automotive metaphor) "overmarketing."

"Studies show," says Cohen, "that semiconductor devices don't sustain damage if the voltage is below 70% of what it takes to destroy something the first time. So if something is going to get wiped out with a 100V surge, I can keep putting 70V surges into it essentially forever with no cumulative damage. This marketing—sometimes even by our own people—about this constant barrage of surges grinding away at your equipment over time absolutely denies the reality of what is going on inside your equipment."

The U.S. military trusts and purchases Zero Surge technology. Panamax is probably the most reputable name in surge suppressor sales. Who you gonna believe?

segment and achieves mixed results. The unit is only rated at 550VA/300W, so we already wouldn't chance this UPS with more than a moderately stocked PC, preferably with a low power TFT display. To compensate, Tripp Lite integrates line conditioning effective from 83V up to 120V. We actually found the volume on/off button on the front readout panel a far more unique and useful feature. The incessant beeping exhibited by every UPS during battery runtime gets very old after about 20 seconds.

Tripp Lite promises a backup time of 17 minutes at half-load and five minutes at full-load, so we were pleased with our 9:43 (minutes:seconds) test result. However, only three of the unit's six receptacles have battery power, and Tripp Lite recommends plugging the monitor into one of the surge-only plugs. Um . . . don't you want to *see* the document or game you're trying to wrap up?

On the other hand, the SMART-550USB's smartest aspect is its software. WatchDog is a nifty background app that monitors critical applications and system services of your choice. If any of these are unresponsive for a specified amount of time, or if the system's CPU load stays too high or too low for an extended period, WatchDog and its companion diagnostics app, PowerAlert, will force an application or even the whole system to shut down and restart. These depend on the UPS' USB connection because there is no RS-232 connection. Similarly, the unit offers in/out phone line protection but not Ethernet or coax.

Tripp Lite recommends the SMART550USB for kiosk and Net application servers, which makes sense given its configuration. In the home or small office, we can see using this model for secondary PCs, such as network storage machines, print servers, or Web /email servers, but not for primary system use. ▲

by William Van Winkle

UPS Scope Waves

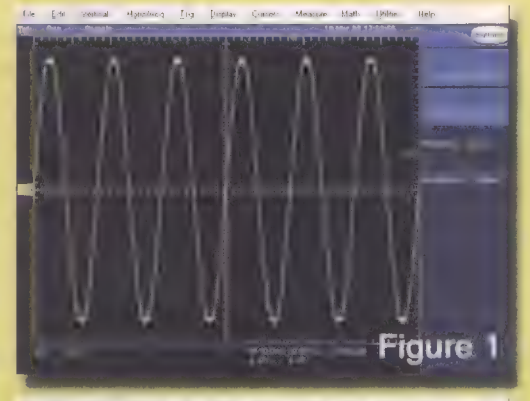


Figure 1

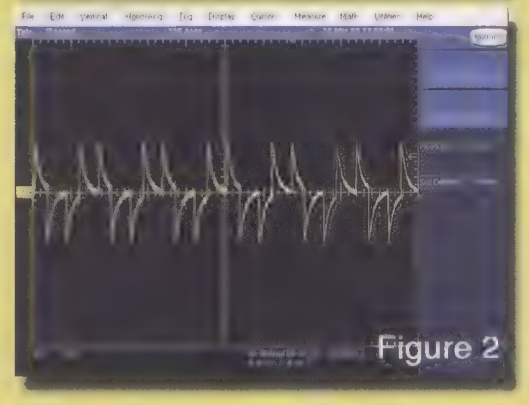


Figure 2

Special thanks go to Tektronix engineer Joe Jones and his Tektronix TDS 5052 oscilloscope. In the following images (Figure 1, Figure 2), you can see the difference between a standard sine wave during regular pass-through operation when the UPS is receiving power from the wall and a step wave when the power is cut. Step waves are common in most low-end UPSes because it is a cheaper design to build. Only the Para Systems S 700 (Figure 3) exhibits a true sine wave in battery mode.

Some critics argue that low-end UPSes, because of supposedly inferior components, throw too much noise onto the line, which can potentially damage equipment. Our tests show that the actual noise present across all models is negligible in both on-line and battery modes. In fact, you can see when we overlay the Belkin and APC (Figure 4) that the two are virtually identical and that both have very clear, clean sine waves.

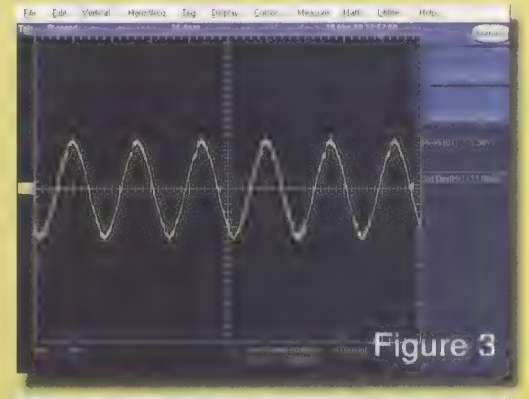


Figure 3

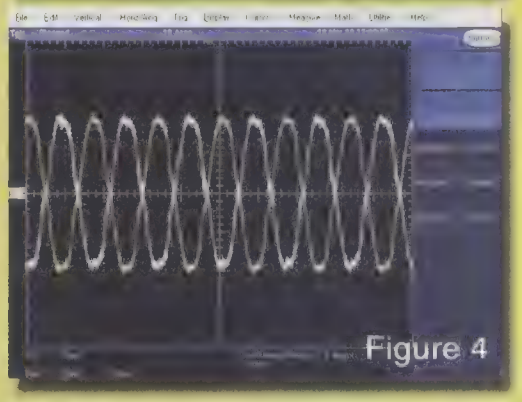


Figure 4

ATI Radeon 9800 Pro

To date, the top of any hardcore gamer's wish list would have included an R300-based Radeon 9700 Pro 3D card. With NV30 delayed, ATI's 9700 Pro seized upon a window of opportunity and swiped NVIDIA's performance crown for the first time in a very long time in 2002. The 9700 Pro's blistering 3D performance with AA and FSAA enabled and first-in-class DX9 feature set make it a firm favorite even today. With NVIDIA's GeForce FX 5800 Ultra cards still MIA (although not yet KIA), ATI has once again upped the performance ante with the Radeon 9800 Pro, based upon the new R350 core.

The "new" R350 core is actually a higher clocked R300 core with some bells and whistles and improved efficiency. Let's start with more of the same, thanks to the 0.15-micron manufacturing process and a 256-bit memory interface. In the short term, it seems as though ATI won the battle, with NVIDIA deciding to opt for 0.13-micron for its high-end NV30. What's new is that the eClock has been upped from the 9700 Pro's 325MHz to 380MHz for the 9800 Pro, and all with a slightly smaller HSF combo, too.

The on-board DDR, while still at 128MB, has been upped from 300MHz to 340MHz (effectively 680MHz), beefing up bandwidth from 19.8GBps to 21.8GBps. With ATI's new SmoothVision 2.1, the memory controller's efficiency has been improved for quicker frame rates when taxing AA (anti-aliasing) and AF (anisotropic filtering) features are turned on in games. Not that the 9700 Pro's SmoothVision 2.0 was poor, but we'll take the second-generation 6XAA and 16X AF modes. Also new is HyperZ III+, where ATI not only added a + but also improved its Z compression technology. Doom III's shadows will apparently look tasty with R350's enhanced Z cache optimized for stencil buffer data.

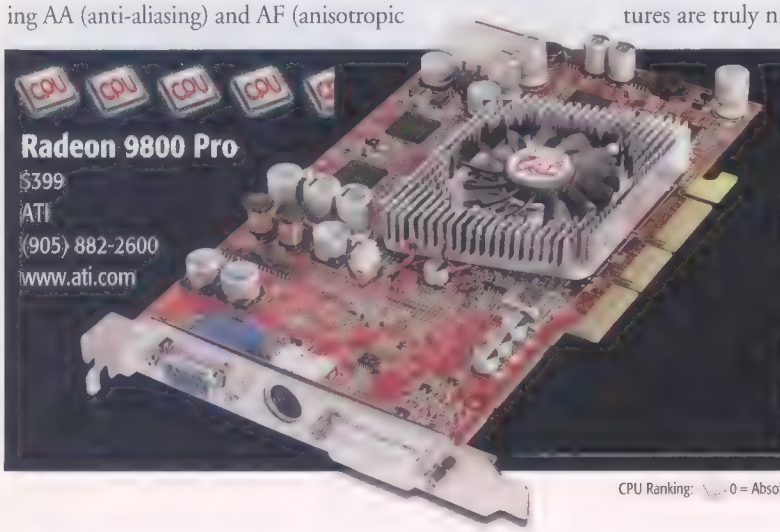
R350 still has eight pixel pipelines with one texture unit per pipe, but efficiency has been improved with snazzier algorithms and whatnot. The whatnot includes SmartShader 2.1 support via a newly introduced F-buffer (Fragment stream FIFO), allowing for faster execution of pixel shader programs with vast amounts of instructions without having to resort to multipass where single-pass is more efficient. SmoothVision 2.1 support churns out even quicker performance under those stressful AA situations.

Just in case you were catching up with DX9, in came NVIDIA's DX9+ from the more cool features/effects beyond DX9 "proper," which game developers will take eons to actually use but nonetheless look snazzy in demos. From the same school of thought that brought us DX9+ comes DX9++. Other than the extra +, the marketing folks are wearing red hats instead of green. New and extended capabilities for R350 include floating point 3D textures, floating point cube maps, multiple render targets, displacement mapping, and N-patches. Again these new 3D features are truly nifty and will look great in games . . . someday. With DX10 (or X?) apparently a few years out and with six-month product cycles, we could have a few more plus signs yet.

All of this efficiency is obviously visible only when cranking up the resolution and turning on AA and AF. Only then does the fill rate and a 3D card's memory bandwidth get stressed enough in today's games to justify you gaining that impressive performance delta between 9700 Pro and 9800 Pro. You can see from the benchmarks that even the GeForce FX 5800 Ultra doesn't fare too well in comparison, either.

Priced at $399 and available by the time you read this, the best just got better with the Radeon 9800 Pro but obviously not enough for you to chuck out your 9700 Pros yet. The 9700 Pro is still an exceptional performer, just not quite as quick. A cheaper and slightly lower-clocked non-Pro version will be available at $349. And just in case you thought that ATI had any space left with which to try throwing its hat in the high-end performance ring, a low-volume 256MB version sporting DDR2 will be available soon with probably even better AA and AF performance at high resolutions, thanks to the increased memory bandwidth. Can ATI keep up this pace? That's two in a row in the last couple of cycles, but will three be asking too much with NV35 looming? ▲

by Alex "Sharky" Ross



Radeon 9800 Pro
$399
ATI
(905) 882-2600
www.ati.com

ATI Ups The Ante

	NVIDIA GeForce FX 5800 Ultra
Unreal Tournament	
1,024 x 768	107
1,280 X 1,024	107
1,600 x 1,200	42
Serious Sam: TSE 1,600 x 1,200	41
Quake III 1,600 x 1,200	103
Jedi Knight 1,600 x 1,200	101

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

NVIDIA GeForce FX 5800 Ultra

NV30: Is it the great green hope or hype? That's the question we've all been mulling over since having been introduced to the technology last year. The brave and aggressive decision to transition from a 0.15-micron process to a 0.13-micron process and 100 million transistors for NV30 proved to be problematic for TSMC, as well as NVIDIA. Throw in a bunch of rumors, and you probably have the reasoning behind this much-talked-about delay, at least for NVIDIA, that is. Nobody said reaching a 500MHz engine clock speed and 1GHz for memory with a 128-bit memory DDR2 (another gamble that probably hasn't paid off) interface with 16GBps peak bandwidth was going to be easy.

The GeForce FX 5800 Ultra is a bulky animal, taking up an AGP slot and the first PCI slot, as well. It's also bloody noisy, but I don't think it'll be as much of a fad as those Bubb Rubb Whistle Tips, which can be heard for miles, even if I do wish it went "Whoo whoo" and had Flowmasters. Nonetheless, NVIDIA's drivers have a rather useful nifty hardware monitor that adjusts the clock speeds and hence fan speed, which is much appreciated, especially when you don't have 5.1 speakers cranked up with shotgun and chainsaw sounds. In normal 2D operation mode, the card runs at lower speeds of 300MHz (GPU clock) and 300MHz (memory) as does the fan RPM. When you're taxing the 3D pipe, the card throttles itself (it's got great low- and midrange torque) straight up to a 500MHz core speed and 500MHz (effectively 1,000MHz) for the memory. There's no annoying turbo-like lag, either, and a lot of time has obviously gone into this useful feature.

Despite being bulky, the 5800 Ultra is somewhat pretty. In order to keep temperatures down, NVIDIA had to develop an extravagant cooling solution with an intake/exhaust, huge dual-sided copper heatsink, and nifty enclosure. Overclockers may enjoy looking at the cooling solution, but they will probably steer clear of a 3D card that rivals a P4 processor in terms of generating heat. Another neat feature of the drivers is a "fail-safe" mode in case you forget to connect the Molex power connector. I won't tell you how I found that out. . . .

For the sake of comparison, benchmarks have to run at high resolutions with AA and AF turned on so that fill rate is severely tested along with the cards' memory bandwidth. Only at resolutions above 1,280 x 1,024 in today's games does one eliminate the CPU from the equation and let real performance deltas between high-end 3D cards become apparent. The 5800 Ultra is leaps and bounds ahead of where the Ti 4600 was as far as AA and AF performance are concerned. It is even with and, in some cases, ahead of ATI's 9700 Pro. But bring on the 9800 Pro, and the picture doesn't look so rosy.

The 5800 Ultra is no Radeon 9800 Pro killer and in the end is a bit of a nonstarter, even if it's still roughly on par with a Radeon 9700 Pro. It's just too little too late instead of being too much too soon. It might even suit NVIDIA to probably sweep NV30 under the carpet, focus on NV31 and 34, and reload for NV35, due out not too long from now. With NV30's long delay, a rather underwhelming performance for a high-end 3D product from NVIDIA, and a nonpractical design (noise and space), so few OEMs have received such a tiny allotment of chips anyway that 5800 Ultra cards will be a rarity.

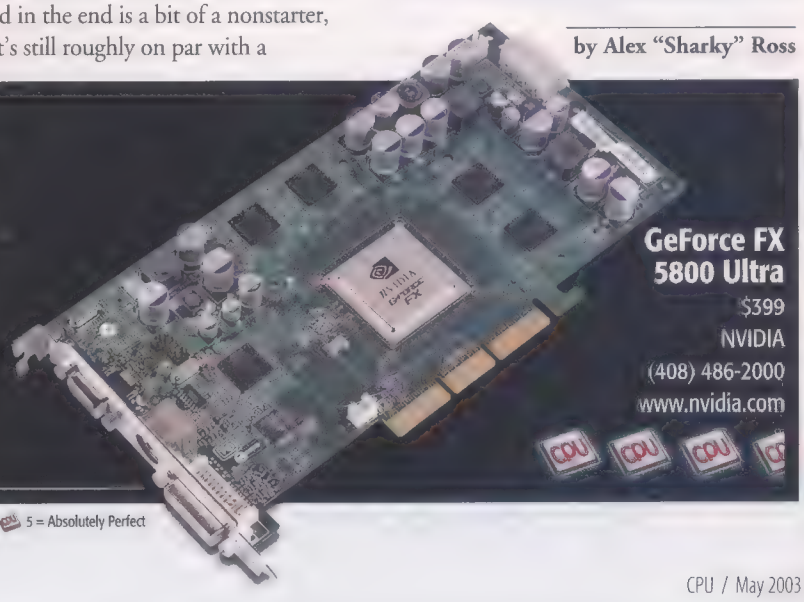
Gambles don't always pay off and when they don't, the situation often ends up looking worse than it really is at the very high end. The truth is, NV30 probably won't hurt much more than NVIDIA's short-term credibility in a very small segment of the market where so few boards are sold anyway. We gamers are a fussy bunch and tend to be dazzled by whatever is fastest at the moment. The real money is made in the lower and mainstream markets where currently NVIDIA is actually doing better than even the company prognosticated. The less-political gamers interested only in the very top echelon of performance will likely keep a hold of their 9700 Pro or opt for a 9800 Pro. Otherwise sit tight for NV35, which NVIDIA claims will be two times faster than NV30. Perhaps the longer-term benefit of 0.13-micron will be more apparent than in this go around. ▲

by Alex "Sharky" Ross

All tests were run with 4X anti-aliasing and 8X anisotropic filtering enabled on a P4 3.06GHz Windows XP SP1 system

	ATI Radeon 9800 Pro	ATI Radeon 9700 Pro
	156	128
	156	128
	67	57
	69	56
	126	112
	130	113

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect



GeForce FX 5800 Ultra
$399
NVIDIA
(408) 486-2000
www.nvidia.com

ATI Mobility Radeon 9600

Mobility Radeon 9600
To Be Announced
ATI
(905) 882-2600
www.ati.com
Preview: No Rating

CPU First Look: Preview

ATI's latest mobile 3D chip, the Mobility Radeon 9600 (part name RV350 and code-named M10), is here. Serious 3D performance on a notebook is at last a reality.

Essentially, RV350 is a Radeon 9700 turned mobile. The chip jumps to an AGP 8X bus and natively supports both DX 9 and 2.0 pixel shaders. You get quad rendering engines, dual vertex engines, 16 textures per pixel, and 12 pixel shader operations per clock. This will be the first mobile 3D chip to break the 300MHz core speed barrier. RV350 uses lossless z-compression and lossless color compression, both of which improve effective memory bandwidth.

With the move to a 0.13-micron process, the M10 achieves a low 1.0V operation and continues the M9's POWERPLAY management system to maximize notebook battery time. In Windows idle mode, the chip consumes only 0.5W.

Prior to the chip's official announcement at CeBIT, I was able to benchmark a pre-production version of the M10, adapted for a desktop card and running with built-in DDR. Of course, numbers can only tell part of the story. The M10's handling of 3DMark03 was reminiscent of a Radeon 9700 Pro or GeForce FX. Some of these benchmarks place the M10 squarely on par with mid- to high-end desktop cards, outstripping even the NVIDIA NV28. (The upcoming NV31 is expected to be competitive.)

When the RV350 arrives in production, it will feature 128MB of DDR. ATI plans to release the Mobility Radeon 9600 Pro this summer with GDDR2-M. (GDDR2-M will clock from 300MHz to 450MHz.)

Gamers will enjoy a clever innovation in the Pro version called OVERDRIVE, which works with an on-board temperature sensor to overclock the M10 to its limit without risking overheating. The first notebooks featuring the RV350 are expected to hit streets in May. ▲

by William Van Winkle

Microsoft Wireless Optical Desktop For Bluetooth

Wireless Optical Desktop For Bluetooth
$159
Microsoft
(800) 426-9400
(425) 882-8080
www.microsoft.com

CPU CPU CPU CPU CPU

Wireless keyboard/mouse combos free up desk space and let you enjoy the freedom of typing with the keyboard in your lap, but the popular RF sets aren't hassle-free. RF combos have limited range: Most sets only operate within 10 feet of the receiver. If this is the reason your keyboard is still on a leash, you're in luck. Microsoft, which recently released several keyboard/mouse combos, including a standard RF combo, is offering a Bluetooth set.

The Wireless Optical Desktop For Bluetooth includes the same contents as other wireless combos: A keyboard, a mouse, and a device that can receive data from the keyboard and mouse. While most combos use a standard wireless receiver, the Optical Desktop uses a transceiver, which is capable of transmitting data and receiving it. The transceiver includes two USB adapters. The corded adapter connects to your PC and sits on your desk. The other adapter lets you plug the transceiver into a notebook.

Whether you attach it to your PC or your notebook, the transceiver acts as a hub for your PAN (personal-area network). You can connect as many as five other Bluetooth devices (such as PDAs, mobile phones, and printers) to the Optical Desktop's transceiver. The transceiver also has better range than standard RF receivers. It can communicate with devices as far as 30 feet away.

The entire Optical Desktop is blue. The keyboard and mouse are Bluetooth versions of Microsoft's Wireless MultiMedia Keyboard and Wireless IntelliMouse Explorer. I like the mouse's height, which makes it easier to curl your hand over it. Several shortcut buttons line the top of the keyboard, and the function keys double as additional shortcut keys when you toggle FLock. Both mouse and keyboard include software that lets you customize the devices.

The Optical Desktop is expensive, but it has better range than standard RF combos, and if you'd like to use your other Bluetooth devices to communicate, the transceiver is a bonus. ▲

by Joshua Gulick

CPU Ranking: 0 = Absolutely Worthless CPU CPU 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

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HP 2025

2025
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The 2025, a carbon- and silver-toned monster of an LCD, provides fantastic imaging and performs at least as well as any LCD I've encountered. The display's 20.1-inch screen handles extremely wide viewing angles and comes with the usual antiglare coating. It has a spectacularly large 1,600 x 1,200 optimal resolution, but what makes the 2025 even better is that it accommodates lower resolutions without losing much clarity. In fact, it has seven preset modes, ranging from a minimum 640 x 480 resolution and 60Hz refresh rate to a maximum 1,600 x 1,200 resolution and 75Hz refresh rate (the same resolution and refresh rate I used for testing).

I ran through DisplayMate's Multimedia Edition diagnostic obstacle course to see how well the 2025 would endure a series of stressful test screens. The display passed every test far better than most LCDs. For example, the video bandwidth index rated a perfect 100, text looked razor sharp in every font and at every size, and the extreme grayscale screen showed the best possible light-to-dark balance. The display also depicted color test screens beautifully with bright, vibrant colors. The 2025 has a 350:1 contrast ratio, which is good but not the best; in testing, however, the display was at least as bright as LCDs that list a 500:1 contrast ratio.

Practical testing yielded consistently top-notch performance from the 2025. Office programs appeared crisp and clear, and high-resolution images looked gorgeous in Adobe Photoshop. An interior shot of a gilded cathedral looked rich and appropriately realistic, and an exterior shot of a park was equally vivid and realistic.

The display works with Windows and Mac and accepts analog, composite, and digital input. If your budget will let you spring for the 2025, it will be worth every cent. ▲

by Cal Clinchard

Maxtor Atlas 10K IV 146.9GB

Atlas 10K IV 146.9GB
$1,039
Maxtor
(800) 262-9867
(408) 432-1700
www.maxtor.com

The Atlas name has been a bankable asset for Maxtor ever since it absorbed Quantum's hard drive business a few years ago. In a SCSI universe where 15,000rpm drives gleam brightest, a 10,000rpm drive such as the Atlas IV refuses to be lost in the glare.

This Atlas' most interesting spec is its very low 4.4ms advertised seek rating (4.3ms in its 73.4GB and lower capacities). Its MaxAdapt feature, according to Maxtor, optimizes the drive's signal integrity for decreased error rates under various loads and system configurations. The Atlas's nonoperating, 2ms shock tolerance rating is 250G, which is pretty typical for a four-platter drive with a 10K spindle speed. Atypical is its relatively low 34dB idle noise rating.

We tested the drive with an Adaptec 19160 Ultra160 card, which means our results should fall within a whisker of the speeds you might see using an Ultra320 SCSI adapter on a single-drive system. Our test PC also had a 1.8GHz P4, 512MB of PC800 Rambus DRAM, and WinXP Pro.

The Atlas IV's random access time of 7.6ms, according to HD Tach 2.61, just edges out the 10,000rpm Fujitsu MAP3147NP's 7.8ms. Winbench99 reported the Atlas IV's access time as 7.68ms. Speaking of Winbench99, it put the Atlas slightly ahead of the Fujitsu in its Business Disk rating of 9,760KBps (9,340KBps for the Fujitsu), but well behind in High-End Disk results (26,600KBps compared to the Fujitsu's 31,700KBps).

In HD Tach sequential transfer benchmarks, the Atlas's 70.6MBps maximum read rate beat the Fujitsu's 67.5MBps and threatened Seagate's Cheetah 15K.3 (75.3MBps). The Maxtor trailed the Fujitsu in average reads (51.8MBps), max writes (43.2MBps), and average writes (33.9MBps). But for server use, where SCSI drives really shine, the Atlas's superior access time and Business Disk ratings carry the day. ▲

by Marty Sems

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

Leadtek WinFast A280LE TD MyVIVO

The GeForce4 Ti 4200 is my favorite GPU these days because of its excellent bang for the buck. Leadtek is one of my favorite video card brands because Leadtek's cards always seem to have a little more zip and generally have nice extra features. Put these two together, and you have the makings of an excellent, pocketbook-friendly video card.

The Leadtek WinFast A280 series is available in several packages. We checked out the WinFast A280LE TD MyVIVO version, an 8X AGP video card with 128MB of DDR SDRAM. The card has DVI support and TV-out and also includes a picture-in-picture option (one for live video, the other for captured video). The WinFast A280 has refresh rates from 60Hz to 240Hz and is compatible with the Win9x/NT 4.0/Me/2000/XP OSes.

The WinFast A280 got off to a good start in our benchmark tests, posting a total score of 9,025 in the 3DMark2001SE test, better than I'd expect for a Ti 4200 card. The WinFast A280 seemed to stumble a little in the first round of the Quake III test, with a frame rate of 204.9fps at a resolution of 800 x 600. That frame rate's a little low for such a small resolution. But the WinFast A280 bounced back during the next two rounds, with a frame rate of 195.3fps at 1,024 x 768 and 122.6fps at 1,600 x 1,200. Not bad at all.

The test scores during the Serious Sam benchmarks were a little better than average, although not fantastic. The WinFast A280 scored 73.5fps during the Karnak demo and posted 82.7fps during the Metropolis demo.

The WinFast A280LE TD MyVIVO is a well-rounded, fairly powerful video card that's within reach of most users' budgets. It's one of the better Ti 4200 video cards available. ▲

by Michael Sweet

WinFast A280LE TD MyVIVO
$170
Leadtek
(510) 490-8076
www.leadtek.com.tw

Nikon Coolpix 5700

It's only natural that Nikon was one of the first companies to create a 5-megapixel camera for a reasonable price. As with most pioneering efforts, the Coolpix 5700 has some brave innovations and glaring missteps.

This high-resolution camera's most obvious feature is its 8X optical zoom lens. It also comes standard with a Li-Ion battery, external charger, and a swiveling LCD monitor.

The monitor is excellent, displaying crisp colors and possessing a fast refresh rate, and its swivel capabilities help compose tricky shots. The downside: Its 1.5-inch screen area is far too small for a camera costing more than $1,000. Forget about using the optical viewfinder instead—all you get here is a power-sucking electronic viewfinder, ostensibly because the huge zoom lens would've partially blocked an optical viewfinder.

Construction-wise, I have to wonder what Nikon's engineers were thinking. The huge zoom lens negates the possibility of creating a compact camera, yet the main camera body is too small to hold comfortably with two hands. Due to the limited case area, the various control buttons and dials are crammed together, meaning you won't make quick adjustments unless your fingers have contortionist abilities. Arthritics beware.

Predictably, image quality was outstanding. Most shots were clear and colorful and featured incredible detail with few of the chromatic problems that plague lenses on lesser cameras. Performance was only average, though. Most troubling were sluggish shot-to-shot times during high-res shooting. When I attempted to take shots in rapid succession, the camera often stalled completely for seconds at a time.

My final verdict is this: If you really want 8X zoom without the hassle of add-on lenses, the 5700 is a terrific choice. But if you're more interested in a high-resolution camera at a reasonable price, take the Canon G3 for a test drive first. ▲

by Nathan Chandler

Coolpix 5700
$1,200
Nikon
(800) 645-6689
www.nikonusa.com

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

Canon CanoScan 8000F

CanoScan 8000F
$299
Canon
(800) 652-2666
(516) 328-5000
www.usa.canon.com

The 8000F is one of the best scanners Canon has produced. Yes, it has the familiar squeaking noise made by a majority of Canon scanners and a few other imperfections, but the scanner's quality of images, speed of scanning, and sturdiness make up for them.

Color in scanned images was balanced and distinct, and it showed good overall contrast. Six photos ranging in color diversity achieved an average scan time of 30 seconds at 600dpi, not too bad. Black-and-white images had a nice mixture of grays that counterbalanced well together and averaged 35 seconds a scan at 600dpi.

The 8000F is equipped with two film adapters that can hold up to 12 negatives or four slides simultaneously. Batch scanning capabilities make it easy to scan the maximum number of slides or negatives concurrently and achieve better-than-decent results. Color negatives and slides showed good color tone and definition, and blemishes were completely covered up. However, black-and-white negatives and slides were a bit faded, lacking brightness and definition.

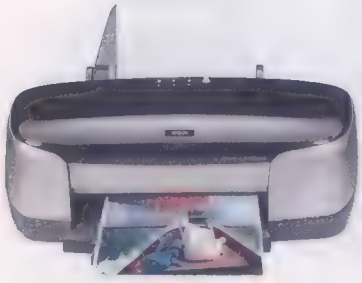
The scanner includes some cool features, such as the ability to notify you when a scan is complete by playing your favorite tune. However, a couple of the features aren't what they appear. For example, Canon boasts a five-second preview time for images, but I could only accomplish this with business card-sized ads at a low resolution, not with a full-sized image.

Multiple user accounts are a bonus for the 8000F, but there is a drawback: The four one-touch buttons will only work with the user account used for the initial setup. To use the buttons on other user accounts, you must install the scanner on each account. This is a nuisance, but something I'm willing to live with for $299.

The 8000F has its faults, but for the price, I can easily overlook them. This scanner proved itself again and again by producing quality images, and after all, isn't that the main purpose of a scanner? ▲

by Mary Lafferty

Epson Stylus Photo 960



Stylus Photo 960
$349
Epson
(800) 463-7766
(562) 981-3840
www.epson.com

If you're a true digital-photo enthusiast, you've been waiting for Epson to offer a photo printer with two traits: individual ink cartridges and better-than-average speed. The 960 delivers on both counts and does so with style.

This rather bulky six-color printer works at a maximum resolution of 2,880 x 1,440 and lets you use rolled paper, as well as an included paper cutter. Using rolled paper is a cool idea—it lets you print photo after photo (including long, uncut panoramic shots), and the paper cutter automatically cuts your borderless prints and drops them into a basket. In Normal mode, the cutter wastes a lot of paper, but the Paper Saver mode cuts prints almost perfectly, though it does occasionally leave tiny slivers of other images on the final product.

Photo quality is as good as you expect from Epson. On glossy paper, details were sharp and colors were rich and accurate, and I saw minute banding on only one or two shots. Plain paper prints had more noticeable banding, but these flaws weren't distracting unless I printed clip art; with these simple images, graphics banding was more prominent.

Performance-wise, this is basic printer. In a refreshing change, there are no flash card slots or on-printer monitors. You use the well-organized driver to manipulate a number of wicked advanced settings, where you can tweak color levels and add special effects (such as Soft Focus and Sepia).

Speeds were excellent, too. It took only a little more than a minute to print a full-page photo on glossy paper; plain-paper shots were done in 45 seconds. In spite of these speeds, the printer is actually whisper quiet, with only the paper feed and cutter making much noise.

I would've liked the option for full page, borderless photos, but the borderless 5 x 7 prints were satisfying. This printer is expensive and worth every penny. ▲

by Nathan Chandler

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

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CPU CPU

Features

Processor: 866MHz Ultra Low Voltage Pentium III

RAM: 256MB/512MB

Hard Drive: 40GB

Optical Drive: External DVD/CD-RW Combo

Connectivity: Modem; Ethernet; 802.11b

Weight: 3 pounds

System Use: Personal

Final Word: Technologically, the M1200 is pretty cool, but I can't find much practicality in it for most users, and I didn't care for the M1200's design.

Motion's M1200 isn't exactly a notebook, but it's closer to a notebook than a desktop. As part of the Tablet PC family Microsoft envisioned, the M1200 is portable in ways a notebook is not. The question is just how useful that added portability really is.

Specifications. If you look at the specifications, you'll notice that the Tablet PC is similar to an ultraportable notebook. The system uses an 866MHz Ultra Low Voltage Pentium III-M processor. Our Power Mobile bundle included 512MB of SDRAM, but a cheaper version of the M1200 is available with 256MB of SDRAM.

Our Power Mobile bundle included a 40GB hard drive, but preconfigured units with 20GB hard drives are available, as well. You can upgrade a 40GB hard drive to a 60GB hard drive for $185. If you order a base configuration, you won't receive a keyboard, desktop stand, or external optical drive. (Our unit shipped with a DVD/CD-RW combo drive, but a straight CD-ROM drive is also available.)

A floppy drive isn't even an option, but all configurations include an Ethernet port and Wi-Fi for networking with existing machines. I think Wi-Fi is a necessity for a Tablet PC, and going without only saves you $31 here. A modem is also included, along with a Type II PC Card slot for adding other networking capabilities.

The 12.1-inch XGA (1,024 x 768) touch-screen display lets you navigate using the specially designed stylus included with the model (more on this later). When mobile, you'll have to rely on the stylus and handwriting recognition, speech recognition, or the virtual keyboard for data entry.

Design. Overall, I wasn't too impressed with the design of the M1200. There were just too many appendages hanging off the device. The external keyboard and optical drive, for instance, plug into the USB and FireWire ports, respectively. I tend to like notebook-style designs similar to Acer's TravelMate C100 better. I can't imagine trying to use the keyboard at an airport.

Before you say handwriting recognition makes the keyboard moot, I'll say there aren't any data-entry methods faster or easier than a keyboard, including handwriting and speech recognition. Neither is quite perfect, and there are certain situations where speech recognition just isn't viable.

As noted, the touch-screen only responds to the stylus, which is good because it would be almost impossible to write if you couldn't rest your hand on the display without triggering the touch screen. If you lose the stylus, though, the touch screen is useless until you get a new stylus.

Although the tablet itself isn't too heavy, it does have a tendency to get heavier the longer you hold it. It also gets warm quickly. As a result, it's not comfortable to hold the unit for an extended period of time.

Performance. Most ultraportables don't do well when it comes to performance because their small size requires a smaller, more power-efficient (read slower) processor. The M1200 is no exception. PCMark 2002 scores showed a 2,720 CPU Score, a 1,621 Memory Score, and a 464 HDD score. The 866MHz Pentium III gets whacked by Mobile Celerons in systems such as the Toshiba 1405-S151 (which posted a 3,414 CPU Score). Memory and HDD scores were closer to what I'd expect from a Pentium III-M system, although the Memory Score is low compared to Pentium 4-M systems. We tried to run MobileMark 2002 on the M1200, but there was insufficient battery life to complete a test run.

Final word. Considering that the processor, hard drive, memory, and network options are all integrated into one small tablet, I can't help but come away impressed from a technological standpoint. If you look beyond the gee-whiz factor, however, price and reality come into play. Our Power Mobile package costs $2,529, not including the optional docking station Motion sent us. For the same price, you can get a serious notebook system that can blow away the M1200 in terms of performance. Even if you're one of the few who could really benefit from the extended portability, I tend to think a design similar to a notebook system makes a bit more sense than this kludgy conglomeration. ▲

by Chad Denton

CPU Ranking: 0 = Absolutely Worthless CPU CPU 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

by Anand Lal Shimpi

Pentium M: The Future Of Mobile Computing

Anand Lal Shimpi has turned a fledgling personal page on GeoCities.com into one of the world's most visited and trusted PC hardware sites. Anand started his site in 1997 at just 14 years old and has since been featured in USA Today, *CBS' 48 Hours and* Fortune. *His site—www.anandtech.com—receives more than 55 million page views and is read by more than 2 million readers per month.*

One of my most trusted contacts at Intel has been telling me for years now that this new mobile chip, code named Banias, would be nothing short of amazing. Now, this guy's track record speaks volumes about how trustworthy his words are; he's never lied to me in the four years that I've known him and I didn't expect him to start now. As time went on, I learned more and more about this mysterious mobile chip called Banias, and finally, just last month, after waiting in anticipation—Banias was launched as the Pentium M processor, a part of Intel's Centrino mobile technology.

For this month's piece I want to focus on the architecture of the Pentium M processor, but before getting to that, let me help explain what Centrino is. The term Centrino Mobile Technology refers to the package of the Pentium M processor, the Intel 855GM/PM chipset, and Intel's Wireless/PRO 2100 802.11b controller. Notebook manufacturers may only brand their systems Centrino if they use all three of those parts; otherwise, they may only call their system a Pentium M solution.

... the 1.6GHz Pentium M offers performance very close to that of a Pentium 4-M 2.4GHz.

Now that you understand what Centrino is, let's take a look at what Pentium M is. In the past, all that was known about the Pentium M was that it would have a very Pentium III-like architecture with the Pentium 4's FSB, but characterizing the Pentium M as a hybrid P3/P4 doesn't do the processor or its very talented Israel design team justice.

The Pentium M starts out with a larger L1 instruction cache than the Pentium III (and Pentium 4 for that matter)—32KB. The larger instruction cache feeds instructions to a longer pipeline than the Pentium III (but shorter than the Pentium 4), thus allowing for higher clock speeds than the Pentium III, which topped out at 1.40GHz on a 0.13-micron process. In order to hide the penalties of a longer pipeline, the Pentium M also uses a significantly more accurate branch predictor than the Pentium III in order to cut down on power wasted by mispredicted branches.

The Pentium M pipeline feeds into an identical set of execution units to the Pentium III, with SSE2 support. The Pentium III's execution layout makes the most sense for a low-power processor, as the wide array of Pentium 4 execution units are not only power-hungry but also lend themselves better to a long pipeline architecture with Hyper-Threading to keep them filled.

Sending data through the pipeline doesn't occur the way we're used to. When instructions are sent to the processor, they are first decoded into smaller micro-ops and are usually then sent down the pipeline. In the case of the Pentium M, these micro-ops are bundled and then sent as bundles down the pipe in order to maximize the efficiency of the pipeline. This technology is what Intel calls micro-ops fusion, and it ends up saving a good deal of power.

On the data cache side of things, the Pentium M features a 32KB L1 data cache and a unified 1MB L2 cache. The cache is optimized for low power consumption, although the exact details of how it works are a bit beyond the scope of this article; the end result is that the cache selects much smaller amounts of data than a conventional L2 cache and keeps the rest in a sleep state. The benefit of this approach is significant power savings at the cost of higher L2 cache latency, but this is the type of tradeoff that was made all over the Pentium M core in order to make it a truly mobile CPU.

The combination of all of these features makes the Pentium M more efficient on a clock-for-clock basis than the Pentium III (which is more efficient than a Pentium 4). The Pentium M is available in speeds from 900MHz to 1.6GHz; the 1.6GHz Pentium M offers performance very close to that of a Pentium 4-M 2.4GHz. Head on over to AnandTech.com for more information on the architecture and performance of the Pentium M along with reviews of the first Centrino notebooks. ■

Broadcast your thoughts to Anand@cpumag.com.

by Alex "Sharky" Ross

Wild On! IDF: Part Deux

Disrupting Reuters' newswire with a cheery Christmas greeting at age six, Alex "Sharky" Ross became an avid computer user/abuser, eventually founding popular hardware testing/review Web site SharkyExtreme.com. Exposing shoddy manufacturing practices and rubbish-spouting marketing weasels while championing innovative products, illuminating new technology, and pioneering real-world testing methods was just a front for playing with the best toys. The site acquired, he left in 2001. A London native and London School of Economics graduate, Alex currently swims in Silicon Valley.

Last month's column was but a sample of IDF goings-on. This month I can divulge yet more info that may or may not be valuable over the next few months/quarters (at least according to Intel).

Although Intel refrained from its usual massively overclocked CPU demos this time (boo!), it seemed as though Moore's Law was still in check, with Prescott being the CPU du jour for day two. Prescott, the P4's (Northwood) successor and the company's next 32-bit processor, should see the light of day before the year's end. It will be the first processor based upon the company's 90nm process, sporting 1MB of L2 cache and an 800MHz FSB. Prescott's L1 cache is doubled from the 8KB on the Northwood, which should help boost Hyper-Threading performance. The transistor count should breach the 100 million mark, which will be a first for CPUs, if not already surpassed by GPUs. The 90nm process will help support Intel's vision of a scalable, next-generation processor, with 4GHz to 5GHz being mentioned for Prescott. A likely introduction could still be 3.xGHz, however.

The transistor count should breach the 100 million mark.

New features will include support for Intel's LaGrande hardware security initiative, advanced Power Management, and improved Hyper-Threading instructions, all meant to be part of the 13 new SIMD instructions in Prescott. Improved branch predictor, prefetching algorithms, and additional write-combining buffers were also mentioned during one of the technology sessions. Prescott will also be the first strained-silicon technology-based CPU (enabling more efficient current flows). AMD has of course gone a different route with its SOI process. Prescott will be manufactured with seven copper interconnect layers and use low-k dielectrics to help reduce capacitance (aka prevent current leakage).

Further on in the future will be the Tejas processor, which was briefly mentioned in Intel's "Powersville" platform slide. The Tejas will apparently replace Prescott and be coupled with DDR2 memory, showing that RDRAM has no place on future Intel road maps. Somewhat ironic is that it has taken over two years since the P4's inception for Intel to not only adopt DDR but to make it a faster performing solution to RDRAM. The first time that will happen on the P4 is with the Canterwood and Springdale dual-channel DDR chipsets, which will match, and in some cases beat, an i850E platform.

And speaking of RDRAM, Rambus was again a Gold Sponsor at IDF. What did the company have up its sleeves? The SiS R658 PC1200-based chipset has never really made anything of itself, even with ABIT's support, but the company talked about the successor, the R659 chipset, featuring Quad-Channel RDRAM. Once again, SiS will be developing the chipset, which will support up to 9.6GB of bandwidth.

Finally, I'm going to push the pause button and spend a moment in the present, where, by the time you read this, Intel's Centrino technology should have been launched. Centrino was thus the focus of the second day's keynote speech. Centrino is basically a convergence (there we go again) or sandwich (much better) of mobile technology, including the Banias (Pentium M) CPU, the Intel 855 chipset, and the Intel Pro/Wireless 2100 networking hardware. Centrino will be in your face, thanks to massive marketing and a $300 million budget, and it may become increasingly more difficult for OEMs to turn to other manufacturer's chipsets when setting up a mobile Intel package. The Banias (now dubbed Pentium M) is largely based on the Pentium III core but with some rather neat additions. Manufactured upon Intel's 0.13-micron process, the Pentium M sports a 1MB L2 cache and a 400MHz frontside bus (Netburst).

Early performance numbers show Centrino notebooks easing past Pentium III-M systems and almost pushing Pentium 4-M systems, as well. Centrino should see mainstream performance sectors get a bump in performance and battery life. Ultra-low voltage versions start at 900MHz and go all the way up to 1.6GHz. An entire mobile ground force of Centrino notebooks was on display at the technology showcase in all different shapes and sizes. However, don't expect Pentium 4 desktop-replacement notebooks to disappear. These wooly (plastic?) mammoths will still be top dogs in terms of performance and of course weight.

That's all from IDF, and don't expect a GDC wrap-up from me either. One geek trade show per month is all I can take! ■

Email me your IDF party gossip at sharky@cpumag.com, and I'll tell you what Samit was up to.

by Kyle Bennett

Didn't Hear This From Me

Kyle Bennett is editor-in-chief of HardOCP.com (hardocp.com), one of the largest and most outspoken PC-enthusiast sites on the Web. HardOCP.com is geared toward users with a passion for PCs and those who want to get cutting-edge performance from their systems. Beware, though, Kyle is known for his strong opinions and stating them in a no-nonsense manner while delivering some of the most in-depth reviews and PC hardware news on the 'Net.

If you're one of the many who have been putting off that upgrade till the "next big thing" comes along, this just may be your month. There are going to be a lot of new computer hardware products hitting the market this month and next, and very likely, some of it's going to fit into your upgrade plans.

First and foremost, the most exciting product to hit the streets is probably AMD's Opteron CPU, better known as SledgeHammer. As I'm writing this, it looks as if it will be upon us toward the end of April. Now you're probably already saying to yourself, "Isn't that a server-class CPU?" That would be correct. The big kicker is that we're hearing of more than one company that's making a single-CPU Opteron retail mainboard. This could possibly deliver the ultimate Hammer experience on your desktop, as the Opteron will have a dual-channel DDR memory controller, whereas the Athlon64 (codenamed ClawHammer; the official desktop CPU to be launched in September) will not. We're assured that the Opteron will come with a hefty price tag, as availability of the CPU in retail form is sure to be scarce. And while we're on AMD CPUs, we will likely see the 400MHz FSB Barton CPUs break loose toward the end of the summer months.

We're assured that the Opteron will come with a hefty price tag, as availability of the CPU in retail form is sure to be scarce.

On the Intel side of things, it's going to be hot, as well. In April, we should see not one but a whole handful of new Pentium 4 CPUs. We all know Intel introduced Hyper-Threading last November, but it was confined to its flagship 3.06GHz P4. Not only are we going to see a new 3.2GHz P4 very soon, but we're also going to see Hyper-Threading reach all the way back to 2.4GHz P4s. There's an upside and a downside to this. The upside is the 2.4, 2.6, 2.8, 3.0, and 3.2GHz CPUs with Hyper-Threading will all take advantage of an 800MHz front side bus. The downside is that to utilize them, you will very likely need a new mainboard. Don't lie; you wanted one anyway. These new P4s will be based on the 0.13-micron Northwood core with 512KB L2. Look for the new Prescott core, with 1MB L2, to land toward the end of the year.

Chipsets for those new AMD CPUs? Of course. Rumor has it that VIA is on top of the list when it comes to K8 chipsets with its K8T400M, but that's yet to be seen. We're hearing many more good reports back about the VIA product than any of the others lining up for the business. While AMD is being quiet about 400MHz Bartons, you almost have trouble shutting NVIDIA up from talking about its nForce2 having 400MHz FSB support. SiS has announced its 400MHz 748 chipset, and we're pretty sure that VIA is lying in wait with the KT400B. I think the Socket A is far from gone and will be an enthusiast mainstay 'til Athlon64 gets cheaper.

Don't think that single-channel DDR333 is going to be fueling the memory bandwidth to all of those 800MHz FSB Pentium 4s we just talked about. The i865P/PE/G and i875P desktop chipsets will be out in force this month. The i875P is the one you will want to keep your eye on. Dual-channel DDR400 will be spec for this board, and we finally have an Intel desktop solution that will fully support the AGP8X spec. Can you believe that Intel will be delivering something with its chipset called PAT, or Performance Acceleration Technology? That almost sounds like overclocking, doesn't it? Yes, you will have to see it to believe it.

There are no big secrets to let loose about video cards that will be on the market for summer, as all the products have already been officially launched—except one. Although it won't be happening this month, you very well might be hearing about NVIDIA's next product, the NV35 GPU, as early as May, but it will probably be more like June or July. 'Til then, be assured you will find plenty of ATI 9600 Pros and ATI 9800 Pros on Best Buy's shelves. And don't be surprised when you see 9800 Pros sporting the VisionTek brand name. ■

Talk with Kyle at kyle@cpumag.com.

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Swappin' Parts

CINDI Gets Accessorized

Each month in "Swappin' Parts," a Computer Power User *writer upgrades one out-of-date component in our test machine, CINDI (Computer In Need of Drastic Improvement). Last month, we added a Plextor CD-RW drive and a Pioneer DVD-RW drive. This month, we're adding a fistful of new input devices and an oh-so-sweet 20-inch flat-panel display.*

We have only just begun CINDI's overhaul, and we are already nearing a crossroads. So far, I have wrapped her up in a new Cooler Master case and installed a Creative Labs sound card and Logitech Z-680 speakers. Last month, Marty outfitted her with a nice pair of optical drives. There's not much more we can do before we give CINDI the Big Makeover, meaning a new motherboard. But we're not quite ready for that step yet. Spring is in the air, and we're hoping a Springdale motherboard will be in CINDI's future—as soon as one becomes available. CINDI will have her coming-out parting soon, but no debutante should attend a gala without a few fine accessories.

This month, I'm going to treat CINDI to one hell of a facial, in the form of a smooth flat-panel display. I'm also going to upgrade her input devices with a new mouse and keyboard, as well as a gamepad and a joystick. This lady will be able to play games with the big boys by the time we're done with her. She's also going to need a USB hub to accommodate all that new hardware.

Best Face Forward

Let's start with the monitor. We pulled a coup here, folks. It's like this: CINDI wants a large flat-panel display that costs a bazillion dollars. The accounting department gasps. CINDI bats her eyelashes. The accounting department gives CINDI what she wants. She's very persuasive that way.

The display CINDI picked out is Hewlett-Packard's awesome 20-inch HP L2025 ($1,420). It is simply gorgeous, both in terms of its stylistic design and image quality. In fact, it's almost too good for CINDI's current hardware (or lack thereof). The preferred settings for the HP L2025 are 1,600 x 1,200 at a 24-bit color depth. Right now, CINDI can only manage 256 colors at a resolution of 1,600 x 1,200 or 24-bit color at a resolution of 1,280 x 1,024. I chose the latter settings, for now.

I installed CINDI's display without any trouble. The L2025 includes an analog and DVI cable. Of course, CINDI has no DVI connection right now, so I connected the analog cable to CINDI's video port. I plugged in the monitor and powered up the PC. CINDI detected the new hardware and automatically installed the drivers for a generic PnP monitor. I installed the software that came with the display, restarted the system, and CINDI's display beamed back at me, ready to go.

Some Input, Please

The rest of the upgrades were nearly as easy as the display. I installed the USB hub next. There are plenty of manufacturers that make good USB hubs, but I decided to go with Belkin's F5U221 USB 2.0 hub ($56). CINDI isn't 2.0-enabled, but the USB 2.0 hub is backward compatible (of

CINDI is dressed to the nines, but she's still an empty suit. For now.

course), and her lone USB 1.1 port simply isn't enough. Not with the other peripherals I'm giving her.

As you'd expect, this installation was almost too easy. Adding a USB hub to a PC is about as difficult as inserting a Krispy Kreme doughnut into your mouth. I plugged the AC cord into the hub, plugged the hub's USB cable into CINDI, and voila! Four more USB ports.

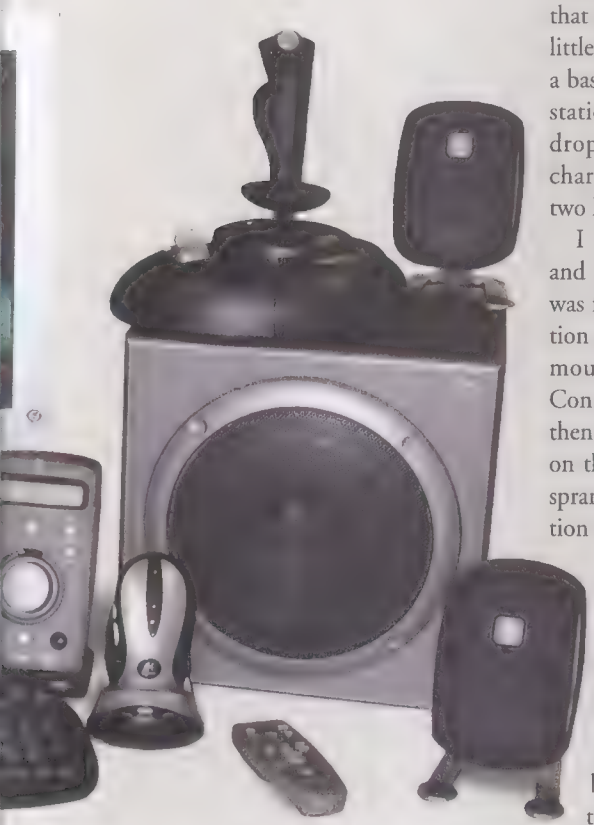
I installed the keyboard next. I've always been a Logitech fan, so I chose (with CINDI's approval, of course) a Logitech Elite keyboard ($31). Logitech doesn't have a wireless version of the Elite keyboard, but the Elite appealed to me, so I decided to go with it. The silver-on-black style of the keyboard matches the monitor quite well, and CINDI's all about coordinating those little details.

The Logitech Elite is a USB keyboard, but I used the included adapter and plugged it into the old keyboard port because CINDI barely has a USB port to spare, even with the new hub. Next, I installed the bundled software, which included iTouch program for assigning the keyboard's programmable keys, as well as a bunch of promotional stuff from Logitech. The keyboard has a nice feel to it, and CINDI can access all of her favorite stuff instantly with the keyboard's programmable buttons.

I tackled the mouse next. I debated for quite awhile about which mouse to buy for CINDI. At first, I decided to go with a Logitech MouseMan Dual Optical mouse. But Samit had recently gotten his hands on a Logitech MX700 ($65), which he swore was the greatest input device since the Sumerians began using sticks to carve on clay tablets. I was somewhat skeptical because my past encounters with wireless mice haven't been good at all. But I deferred, and I think CINDI's happy with the decision. The mouse, like the keyboard and monitor, is black with silver trim. Apparently this is CINDI's favorite haute couture color scheme. Or she's a Raiders fan. We'll see.

The MX700 has an AC cord that you plug into the back of the USB connector that plugs into the system, which seems a little unusual to me. The MX700 includes a base station that doubles as a recharging station. I installed the base station and dropped the mouse into it so it could charge up, which takes a maximum of two hours.

I installed the MouseWare software and restarted the system once the mouse was fully charged. The MX700's base station has to establish a connection with the mouse for it to work, so I pressed the Connect button on the base station and then pressed the *very* tiny Connect button on the bottom of the mouse. The mouse sprang into action as soon as the connection was established.



I have to admit that I really liked the MX700 after using it for a while. One of the things I like best about it is the extra buttons. The forward and back buttons next to the thumb rest are especially convenient, and I like the Cruise Control buttons also. I'm always flipping through documents and programs, so I'd get a lot of use out of the Quick Switch Program Selector button. In addition, the mouse has a comfortable heft to it, and the wireless connection seems solid.

Still More Input

CINDI is a young PC, and as such, we know she likes to kick up her heels and have a little fun now and then. That being the case, I decided to deck her out with a couple of extra input devices: a Thrustmaster gamepad and a Microsoft joystick.

We firmly believe in force feedback devices at *CPU*, so we chose Thrustmaster's Firestorm Dual Power gamepad ($30), a force feedback pad you can switch between analog and digital modes.

I plugged the gamepad into one of the USB hub's open ports and installed the software. Next, I checked the Game Options in Control Panel, and that's when CINDI started getting a little buggy. I double-clicked the Game Options icon and waited for it to open. And waited. And waited. . . . At first I thought the PC had locked up, but after waiting a couple of minutes, the Game Options dialog box *finally* opened. CINDI had successfully detected the gamepad, so I was ready to play.

I installed the Microsoft SideWinder Force Feedback 2 ($86) joystick last and encountered the same problem I had with the Thrustmaster gamepad. I plugged the joystick into a USB port and installed the software, but when I double-clicked the Game Options icon in Control Panel, I had to wait forever for it to open. Maybe CINDI isn't a playa after all. OK, she's definitely not a gamer yet. But she will be soon enough.

Clearly, we're running out of new toys to install before we're forced to change CINDI's motherboard, which will be the major turning point in CINDI's career. But before we do that, we're going to squeeze in one more upgrade. It seems that CINDI has a passion for movies, so next month we're going to outfit her with some sweet video-editing gear. We know, we know! CINDI *does* need a new motherboard! Be patient, friends. It's coming soon, but not next. CPU

by Michael Sweet

X-ray Vision: FireWire 800

There's no avoiding the quickly growing popularity of digital imaging and digital video among consumers. As DVD burners become more popular, the move toward digital media should continue unabated.

Although technological improvements in digital cameras and DV camcorders have played a key role in sparking this digital media revolution, arguably the most important technology involves high-speed serial interfaces. The widespread availability of FireWire and high-speed USB connections has made transferring large digital media files a manageable process for consumers. We're pretty sure that if you had to use an old serial connection to download today's 5-megapixel photos from your digital camera, you might have a hard time viewing the photos from little Johnny's eighth birthday party before he graduates from high school and those One Hour Photo kiosks wouldn't all be drive-through cappuccino and espresso stores now.

The developers behind the competing FireWire and USB high-speed interfaces continue to tweak their already powerful technologies. FireWire developers have fired the latest salvo, announcing an upgrade to the high-speed standard that will allow for data transfers at speeds as fast as 800Mbps. FireWire 800 (also called IEEE 1394b) should continue to fuel the popularity of digital media, especially digital video.

Key FireWire 800 Specs

- Data transfer speeds as fast as 800Mbps.
- Transfers over distances as far as 330 feet with the right setup.
- Plug-and-play, hot-swappable connectivity.
- Backward-compatibility with all current FireWire products.

Source: Apple

Going The Distance

If you need to transfer data long distances between devices, FireWire 800 can offer unmatched specs compared to other high-speed data-transfer options. Keep in mind that you won't always reach the maximum data transfer speeds shown here for the various technological standards. You'd need cables, hubs, ports, and devices that all support the standard before you could reach the maximum speed.

Device	Distance	Speed
FireWire 800	330 feet	800Mbps
FireWire 400	15 feet	400Mbps
USB 2.0	17 feet	480Mbps

In The Beginning

Apple Computer developed FireWire technology in the early 1990s as a means for connecting peripherals to Macintosh computers. The industry adopted FireWire in 1995 as the IEEE (Institute of Electrical and Electronics Engineers) 1394-1995 standard with a maximum data transfer capacity of 400Mbps. The IEEE slightly altered the standard in 2000 and called the tweaked version 1394a. With the recent introduction of FireWire 800, the previous standard now becomes FireWire 400.

Although Apple and Sony were the earliest supporters of FireWire in the mid-1990s, other companies began adopting the technology in the late 1990s, as a high-speed USB standard was slow to come to market. USB 2.0 appeared in 2000, offering data transfer speeds as high as 480Mbps and putting it in direct competition with FireWire. Many external hardware devices support one standard over the other, although some now provide ports for both standards. Newer computers often feature both FireWire and USB 2.0 ports.

Many devices, including digital camcorders, external hard drives, external optical drives, and MP3 players, feature support for FireWire's high-speed data transfers. FireWire is especially popular among DV editors and enthusiasts. FireWire's early support for isochronous mode, which is a key element in smooth data transfers for DV, and its initial high-speed capabilities made it an ideal technology in the early days of DV. Many of those early FireWire users have remained loyal to the technology.

The More Things Change . . .

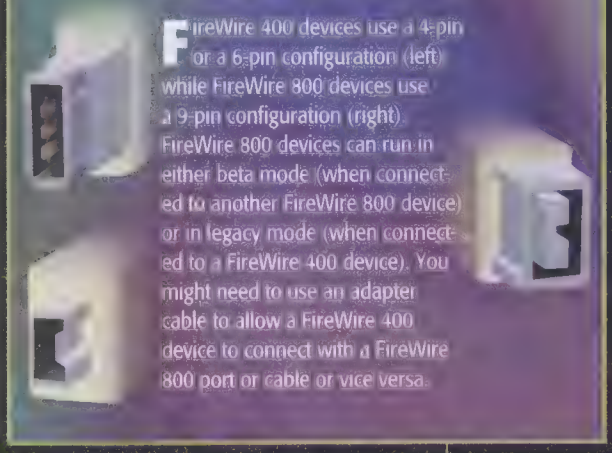
FireWire 800 represents the next generation in the technology. FireWire 800 is an implementation of the IEEE 1394b standard, which the IEEE adopted in 2002. Again, Apple is leading the way in development of FireWire 800, and it included a FireWire 800 port alongside a FireWire 400 port in its 17-inch PowerBook G4 notebook computer. At press time, this and the latest PowerMac G4 were the only computers we knew of to include support for FireWire 800.

FireWire 800 makes use of encoding schemes found in gigabit Ethernet to achieve its improvements in data transfer speeds. FireWire 800 also expands the distance over which it can transfer files. Under ideal conditions—and we stress that point—FireWire 800 can deliver data over cables as long as 100 meters (about 330 feet) in length. FireWire 400 was limited to cables up to 4.5 meters in length (about 15 feet). The additional cable length gives you greater flexibility when setting up audio or video projects. For example, the video or audio recording equipment could be in one room, and the editing computers could be in another room using FireWire 800.

However, to receive the maximum benefits from the increased cable length,

you'll need to be using glass optical cable and a FireWire 800 hub. Other types of cables won't allow for the 330-foot length at FireWire 800's top speed of 800Mbps.

Legacy vs. Beta



FireWire 400 devices use a 4-pin or a 6-pin configuration (left) while FireWire 800 devices use a 9-pin configuration (right). FireWire 800 devices can run in either beta mode (when connected to another FireWire 800 device) or in legacy mode (when connected to a FireWire 400 device). You might need to use an adapter cable to allow a FireWire 400 device to connect with a FireWire 800 port or cable or vice versa.

. . . The More They Stay The Same

FireWire 800 developers didn't change everything about the standard, leaving many of the key features alone. This consistency lets FireWire 400 devices connect to a FireWire 800 port when you use an adapter cable. (FireWire 800 cables use a 9-pin connector; FireWire 400 cables use a 6- or 4-pin connector.)

Hot swap. FireWire 800 devices remain hot swappable with plug-and-play connectivity, meaning you can add and remove them without having to reboot the computer or install drivers before using the devices.

Chained together. You can still connect as many as 63 devices to a single FireWire 800 port on your PC. FireWire 800 devices can run through a hub or can connect to each other through a daisy-chain format.

Peer to peer. You can connect a FireWire 800 device, such as a digital camera, to multiple computers at the same time when using a FireWire 800 hub, just as you could with FireWire 400.

Plenty of power. FireWire 800 still provides 45W of power to devices through the FireWire connection, enough power to run some (such as an MP3 player) without the need for an external power cord. USB 2.0 provides only up to 2.5W of power through the connection.

Let It Burn

As part of the IEEE 1394b standard, FireWire configurations that would allow for data transfers up to 3.2Gbps, or 3200Mbps, eventually will be possible. Undoubtedly, such incredible data transfer speeds would have DV enthusiasts drooling. FireWire 3200 would be able to handle extremely demanding video applications, such as uncompressed HD video.

Although FireWire 3200 is probably a few years away, a few FireWire 800 products already are available. At first, it's going to be difficult to reach the maximum data transfer speeds and distances the FireWire 800 standard allows. Once you've collected all of the correct hardware, cables, and hubs, though, you'll find no faster method for transferring data, for a while, anyway. Then you'll have a new problem: Trying to shoot enough DV to take advantage of FireWire 800's high speeds. CPU

by Kyle Schurman

Subscribers can see www.cpumag.com /cpumay03/fw800 for more.

The Cable's The Key

Using the correct type of cable is the key to achieving the high data-transfer speeds and the long-distance data transfers possible with FireWire 800. Only by using FireWire 800 ports with 9-pin connectors and glass optical fiber cable can you reach the standard's maximum data-transfer speed of 800Mbps over a maximum cable length of 330 feet. Here you see the specific [illegible] PowerBook G4 and the [illegible] Mac G4, pictured here.

This product does not feature a FireWire 800 port; it's just for show in this graphic.

9-pin shielded twisted pair copper:
15 feet maximum length at up to 800Mbps

Standard Ethernet cable:
330 feet maximum length at up to 100Mbps

Step-index plastic optical fiber:
165 feet maximum length at up to 200Mbps

Hard polymer-clad plastic optical fiber:
330 feet (100m) maximum length at up to 200Mbps

Glass optical fiber:
330 feet (100m) maximum length at up to 800Mbps

Courtesy of Apple

Graphics & Design: Jason Codr & Carrie Benes

Next-Generation Chipsets

Intel's Springdale Ready For Launch

If microprocessors are the stars of the computing stage, chipsets are the understudies. Media attention focuses on releases of microprocessors. Introductions of new chipsets typically don't garner large amounts of media attention. Microprocessors receive cool names, such as Pentium, and hip ad campaigns. Chipsets toil in the background with nondescript names such as 865.

The focus of the attention on microprocessors shouldn't be surprising: After all, microprocessors are called the brains of the computer. But if the brain has to sit idle because it isn't receiving enough data to process, its capabilities become limited. That's where the chipsets come in; they make sure the processor receives its data in a quick fashion.

Although the chipsets perform a vastly different job than the processor, they are almost as important as the processor in determining the speed of a computing system. They essentially serve as the pipeline between the system's processor and memory, letting large chunks of data move at one time.

The chipset enhances the overall speed of the system. It can also be a severe bottleneck that hinders the system's speed when it isn't able to match the performance demands of the memory and the processor. If the chipset can't deliver data between the processor and memory quickly enough, the processor won't be used to its full capacity.

But bottlenecks shouldn't be a problem with Intel's upcoming release of a new generation of chipsets for desktop computers, currently code-named Springdale. The Springdale chipsets, scheduled for release in the second quarter of 2003 (probably sometime in May, by the time you're reading this), will pave the way for new technologies to appear in mainstream desktops. They'll also bring some high-speed capabilities not seen before in consumer-level computer systems.

Preliminary Springdale Data

The Springdale chipsets will work with Intel's Pentium 4 family of processors using Hyper-Threading technology, bringing this technology to mainstream computers. (Other Intel chipsets support Hyper-Threading, but they've been aimed at high-end computers until now.) Some versions of Springdale will provide integrated graphics, too.

Although all of the details concerning the Springdale chipsets weren't yet officially available at the time of this writing (Intel hadn't yet announced any performance data, pricing, or availability for

Hyper-Threading Joins Mainstream

With the introduction of Springdale, Intel is bringing its Hyper-Threading technology into its mainstream processors and chipsets.

Hyper-Threading has been an interesting technology since its introduction last year in high-end Intel chipsets and processors. Hyper-Threading technology lets the processor be more efficient by processing two threads simultaneously. Support for Hyper-Threading occurs in Windows XP SP1, and industry analysts now expect the adoption rate to speed up among other software developers.

As Hyper-Threading moves into mainstream computing, reports say Intel is preparing improvements to the Hyper-Threading technology, which may appear in the upcoming Prescott line of processors. The improvements, possibly called Hyper-Threading II, haven't yet been revealed publicly, but they may include the use of more than two threads and the use of asymmetric threading, allowing designation and faster processing of a main thread.

VIA's Next Chipsets For AMD

VIA's latest chipsets are providing plenty of power for AMD processors, including its K8T400M chipset, designed for the AMD Hammer processor. The K8T400M chip will work with all segments of the computing market, while the K8M400 will work with mainstream and corporate desktop computers.

The K8T400M and the K8M400 both feature an 800MHz HyperTransport connection for use with the AMD K8 processor, as well as support for AGP 8X, ATA/133, USB 2.0, and 10/100 fast Ethernet technologies. The K8T400M is built on 0.22-micron technology, while the K8M400 is built on 0.15-micron technology. The K8M400 features integrated CastleRock II graphics, while the K8T400M features discrete graphics.

In 2002, VIA released the KT400 chipset, aimed at high-performance desktop computers with the Athlon XP and Duron processors, and the KT333, aimed at mainstream computers. This year, VIA will release the KM400 and an updated KT400, called the KT400A, for Athlon XP systems.

VIA also continues working on chipsets for Intel's Pentium 4, but the two companies were in litigation over the products at the time of this writing. Intel hasn't given VIA a license to create chipsets for the Pentium 4.

The Future For Intel Chipsets

Even though Intel will not comment on its future products, several reports have surfaced, spelling out the possible future for Intel's chipsets. The next generation of Intel chipsets, code-named Grantsdale, could appear in the second half of 2004 and may yield a complete overhaul of the computer.

Analysts expect that Grantsdale will bring about many innovations in the PC, including the advent of PCI Express, introduction of a new graphics core, and easier support for wireless communications. It may support DDR-2 memory and up to four DIMMs.

Analysts say the Grantsdale chipset could represent some of the biggest changes in chipsets since Intel developed an AGP-enabled chipset in 1997. The Grantsdale will reportedly work with still-in-development Intel processors, code-named Prescott and Tejas.

the chipsets), here's a list of some of the items Springdale will support:

- Dual-channel DDR400
- An 800MHz system bus
- Integrated graphics through Extreme Graphics 2
- CSA (Communications Streaming Architecture) for Gigabit Ethernet
- AGP 8X
- Integrated Serial ATA
- Integrated USB 2.0
- Hyper-Threading technology
- Four-layer motherboard

Here's a closer look at some of the features and technologies you'll find in the Springdale chipsets, which will become the 865 model family of chipsets, upon release.

800MHz System Bus

Intel has designed the high-end Springdale chipsets to take full advantage of an 800MHz system bus and dual-channel DDR400 memory. (Low-end Springdales will top out at a 533MHz system bus and DDR333 memory.) The Springdale chipset packaging helps ensure it can handle the speeds of DDR400. First, the chipset incorporates self-compensating drivers that eliminate PVT variation. (PVT [process/voltage/temperature] variation occurs because of the physical nature of silicon and affects the timing parameters of the device.) Second, the chipset features adjustable clock outputs to enable adjustments based on DIMM population. Finally, a managed receiver termination improves the signal quality during high-speed transactions.

Early reports from several months ago concerning Springdale had the chipset supporting a top system bus of 667MHz, rather than the 800MHz of the final version. Analysts say Intel's decision to bump the system bus speed to 800MHz was made in part because the upcoming release of the next generation of the P4 microprocessor (code-named Prescott) will make use of an 800MHz system bus. Prescott should appear in the fourth quarter of 2003.

The 800MHz system bus will be a major improvement on the Pentium 4

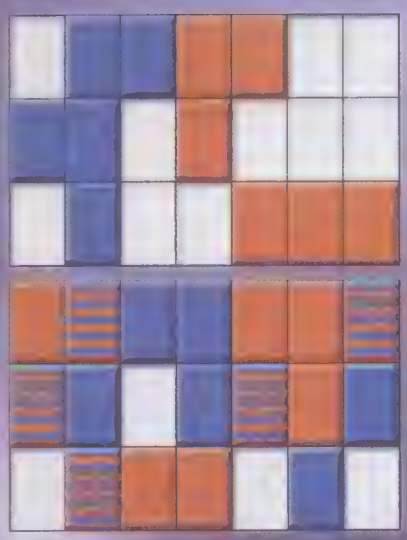
Canterwood Makes Its Appearance

At the same time as the upcoming release of Intel's Springdale chipsets for consumer-level computers, Intel is scheduled to release its Canterwood chipset, aimed at the enthusiast and professional markets. (See the Canterwood in our Alienware system on page 47.) At press time, Intel hadn't yet released all of the official details about Canterwood, but here's what we do know about what the Canterwood chipset will support:

- Dual-channel DDR 400
- An 800MHz system bus
- Communications Streaming Architecture for gigabit Ethernet
- AGP 8X
- Intel PAT (Performance Acceleration Technology)
- Integrated USB 2.0
- Integrated Serial ATA
- Hyper-Threading technology
- Four-layer motherboard

Canterwood's official model name upon release will be the 875 chipset.

Hyper-Threading In Action



Hyper-Threading technology allows a microprocessor to process two threads at one time, essentially creating a virtual dual-processing unit.

In the top example, a microprocessor must process one thread (in blue) before starting on the second thread (in orange). The white squares represent idle times.

In the lower example, a microprocessor using Hyper-Threading can process two threads simultaneously, making better use of the processor's power and eliminating idle times. At times, though, the processor must slow down to meet the simultaneous needs of the threads (represented by orange and blue stripes).

Intel's Springdale chipset should bring Hyper-Threading technology to mainstream computers.

Source: Intel

chipsets' top current bus speed of 533MHz. By increasing the speed of the system bus, manufacturers increase the rate with which the processor can obtain data and the amount of data that transfers at one time. You'll find the 800MHz system bus can support 6.4GBps of bandwidth for the processor.

Dual-Channel DDR400

The Springdale chipset will be the first dual-channel DDR chipset for the desktop Pentium 4 market. (The Granite Bay chipset from Intel uses dual-channel DDR, but it's aimed at high-end desktops and workstations.) Initial reports had Springdale supporting a maximum of DDR333, but Intel decided to bump the chipset's support up to DDR400. Analysts say the DDR400 support is necessary to let the chipset meet the 6.4GBps bandwidth needs of Prescott's system bus.

With support for dual-channel DDR appearing in Springdale, analysts say it appears Intel has decided against including any further support for RDRAM in its chipsets after the i850E chipset, released last year. At one time, Intel and Rambus, the maker of RDRAM, were close partners. However, analysts say Rambus' myriad problems with litigation and high prices probably have permanently damaged the relationship between Intel and Rambus.

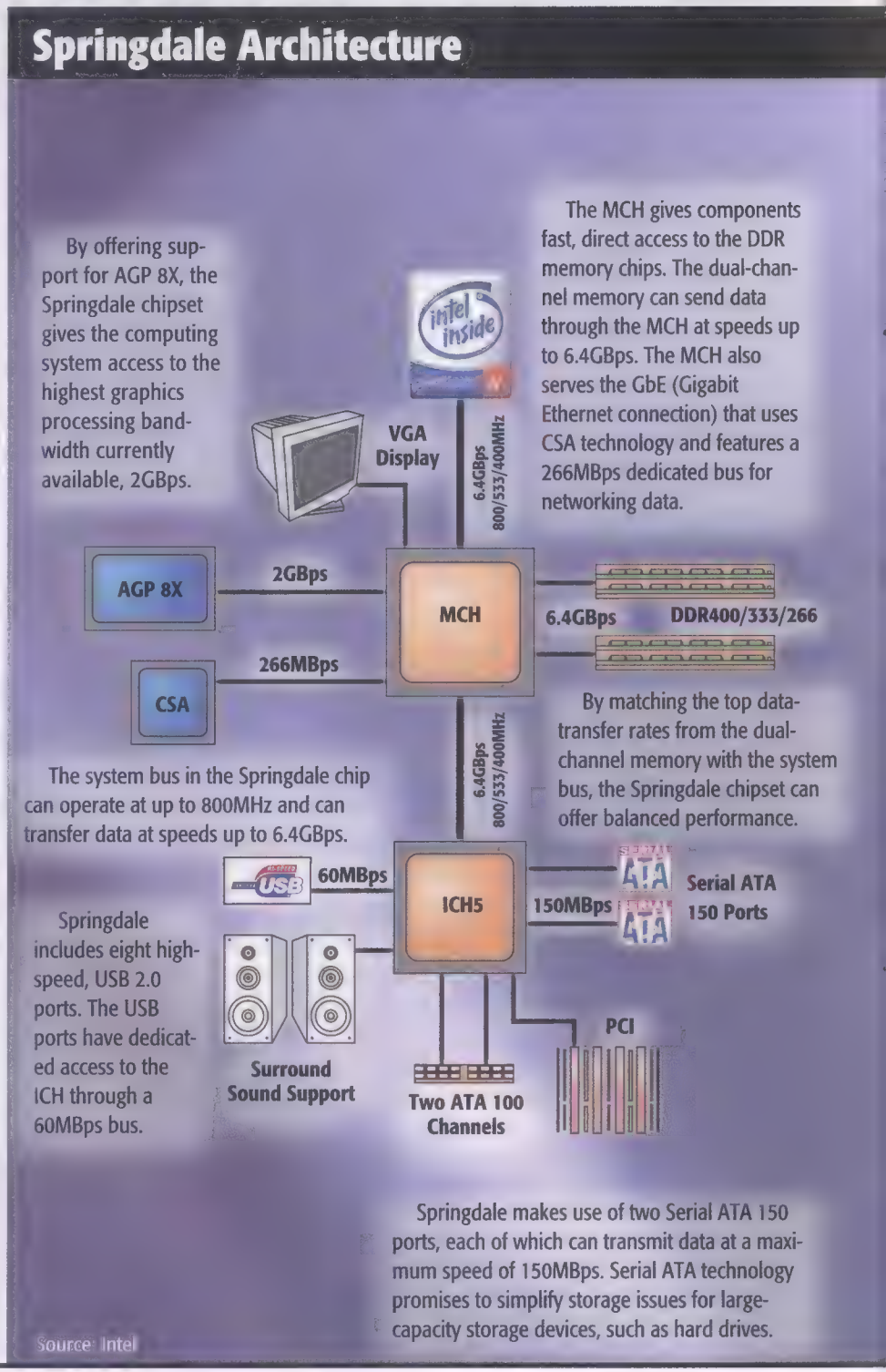
Serial ATA

The Springdale chipset will include support for the first generation of Serial ATA, which is a data storage interface designed to simplify storage issues. Serial ATA is a point-to-point connection that lets a single controller implement multiple ports. It's a replacement for parallel ATA. Serial ATA makes system and motherboard design easier because it uses small connectors and long, flexible cables. It also reduces the space required for routing on the motherboard.

The first generation of Serial ATA will offer a 1.5Gbps signaling speed and a maximum data transmission rate of 150MBps. The second generation of Serial ATA, projected to debut in 2005, will offer a 3Gbps signaling speed and a maximum data transmission rate of 300MBps.

In addition to Serial ATA, Intel is incorporating software-based RAID technology into the ICH (I/O Controller Hub, or south bridge) portion of the chipset. Demand for RAID technology among desktop platforms is on the rise as users begin demanding hardware that can handle DV editing, high-end games, and DVD authoring.

Springdale Architecture



RAID technology lets the chipset handle dual Serial ATA connections of 150MBps data transmission rates. This is the first time RAID technology has appeared in a chipset. The ICH will contain support for as many as eight USB 2.0 ports, too.

Communications Streaming Architecture

Springdale will give Gigabit Ethernet networking a boost thanks to Intel's CSA (Communications Streaming Architecture). The Gigabit Ethernet controller connects to the MCH (Memory Control Hub, or north bridge) of the Springdale chipset via a 266MBps CSA bus that's dedicated to networking I/O and that gives prioritized access to Gigabit Ethernet traffic. CSA technology gives the Gigabit Ethernet controller easy access to system memory, too.

By making use of CSA for networking, the Springdale chipset frees the PCI bus bandwidth for other I/O operations. Making use of CSA will remove bottlenecks from the MCH/ICH link in the chipset, as well.

The CSA architecture is invisible to the operating system and to other system software, appearing as a PCI configuration. The added speed and performance found through CSA gives users a better chance to make full use of the power available with Gigabit Ethernet. Other benefits of CSA include lower latency for network traffic, more efficient handling of bursts of network traffic, better management of simultaneous data streams, and reduced strain on the microprocessor.

It's expected that the CSA bus will be an optional part of Springdale. Only those motherboard manufacturers that will ship motherboards containing built-in Gigabit Ethernet support will make use of the CSA interconnect. Some analysts say that because CSA will only work with the Intel chipset, other chipset manufacturers will have to work at including a similar feature, or they will risk losing market share for networking chipsets to Intel.

A Headline Act

Industry analysts who had an early peek at Springdale generally were impressed with the chipset's features and power. Overall, analysts expect increased data flow rates from Springdale by at least 5%. They expect Springdale to become a major force in the chipset market.

Springdale definitely brings some interesting new technologies to the desktop market, and its anticipated release is generating plenty of buzz in the industry. It's not quite the buzz of a new processor, but what can you do? Maybe a new ad campaign featuring some actors wearing blue body paint would help. . . . CPU

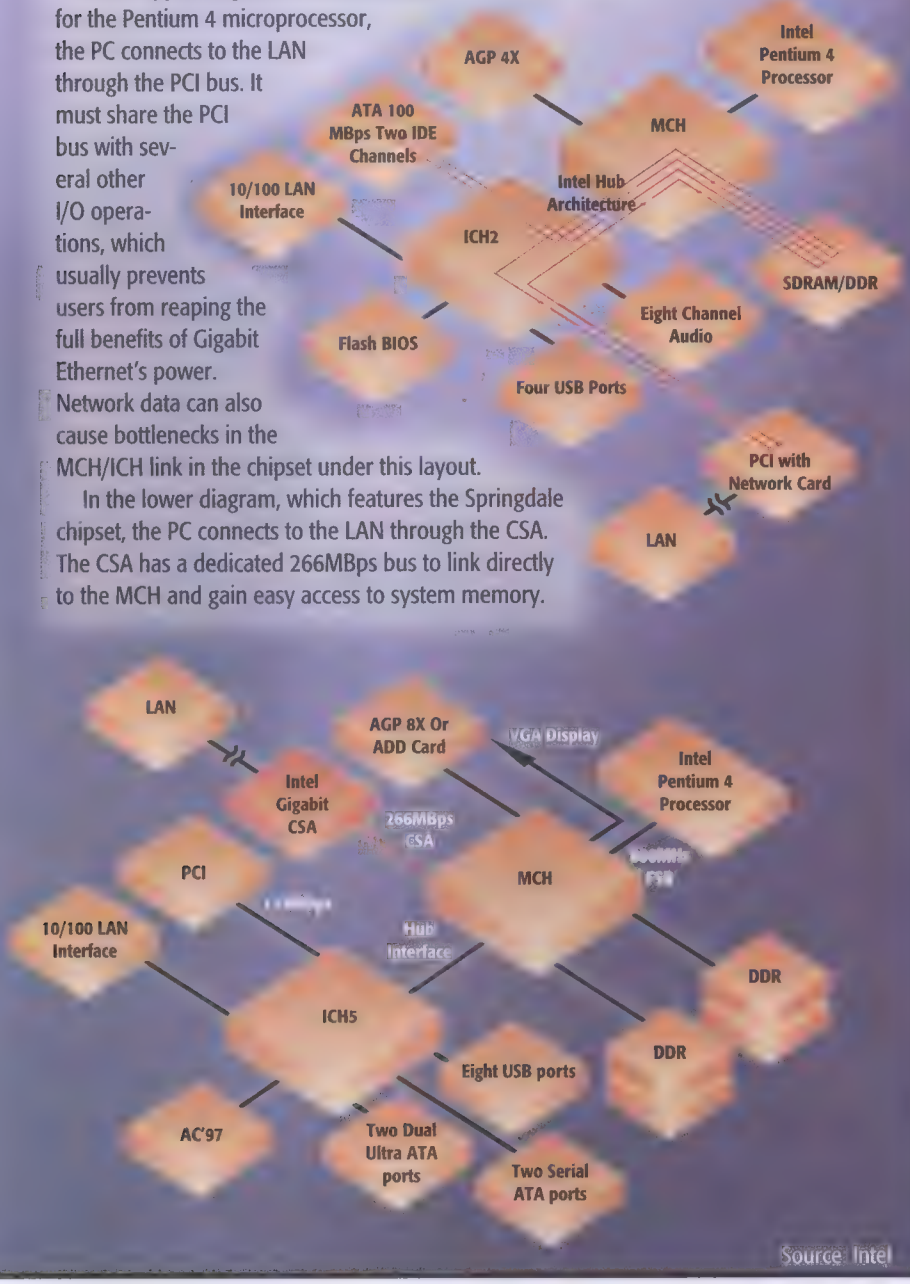
by Kyle Schurman

Communications Streaming Architecture

The CSA technology contained in the new Springdale chipsets from Intel will give prioritized access to Gigabit Ethernet traffic.

In the upper diagram, an older chipset for the Pentium 4 microprocessor, the PC connects to the LAN through the PCI bus. It must share the PCI bus with several other I/O operations, which usually prevents users from reaping the full benefits of Gigabit Ethernet's power. Network data can also cause bottlenecks in the MCH/ICH link in the chipset under this layout.

In the lower diagram, which features the Springdale chipset, the PC connects to the LAN through the CSA. The CSA has a dedicated 266MBps bus to link directly to the MCH and gain easy access to system memory.



Source: Intel


DVD-RW
DVD-R
control
Panasonic DVD Multi Drive.
Now you can read and write
data and life's moments to
DVD-RAM, DVD-R, DVD-RW,
CD-R and CD-RW.
Capture, Edit, Burn.
Control your media, control your life.
Panasonic
LF-D521
DVD
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The Pack is Back

Sizzling Systems That Will Leave You Drooling

Every few months we have the urge to go over the top. We see a lot of great hardware here at *CPU* headquarters, but that's not enough to satisfy us for very long. We want the very best stuff money can buy. We want systems that make us dizzy. And we want them all at once. Last year (April 2002) we satisfied that urge with a "Leaders of the Pack" special featuring three systems from three of the top PC makers. The systems we reviewed were an exercise in decadence, and it's been too long since we've had that pleasure. It's time to bring back the Pack, the very best PCs from the very best companies.

There are plenty of good system makers out there who aspire to be the best, who dream of creating the ultimate systems, and who do, in fact, produce some great PCs. But a great PC in and of itself does not qualify as a leader of the pack. We need something more. We're looking for Lamborghini rather than Lexus. Bentley rather than BMW. Ferrari Maranello rather than Ford Mustang. We're indulging ourselves in the best luxury systems around, made by a small cadre of companies that know how to do it best: Alienware, Falcon Northwest, and Voodoo PC. These three stand out among the crowd because their systems are always superb, always eye-catching, always made with the best components, and always crafted with love for the machine, and they've been doing it for years.

We invited Alienware, Falcon Northwest, and Voodoo PC to send us the best, most powerful, most outrageous systems they could muster, and they did not disappoint. If words like "Canterwood," "Barton," "Serial ATA," and "7.1 THX home theater" make you shake, you'd better strap yourself in really tight before you read this article.

Each of the systems here is jaw-dropping gorgeous right out of the box, but they aren't merely show ponies. These systems are ready to rumble. We spent a good amount of personal time with each PC so we could get to know it better, and in the process we ran a slew of benchmarks on each one.

We began with a pair of 3DMark tests: 3DMark2001SE for those of you who don't care for 3DMark03 and 3DMark03 for those of you who don't care that others don't care for 3DMark03. We also ran PCMark2002 and SYSmark2002, although we couldn't get SYSmark2002 to run on the Alienware system, despite all of our troubleshooting, tweaking, and swearing, so we cut it out completely.

We also threw a battery of gaming demos at each system, beginning with the old-school Quake III benchmark. Next we had each system tackle the tough AquaMark 2.3 demo. (Sadly, version 3.0 was not quite ready at the time we tested the systems.) The systems finished their seven-course benchmark feast with an Unreal Tournament 2003 demo (version 2.3), courtesy of our boys over at [H]ard|OCP.

Great looks, cutting-edge hardware, tremendous power, high sticker prices—these systems have it all. We think after reading the next few pages, you'll agree that these three PCs do indeed deserve to be called the Leaders of the Pack.

by Cal Cleveland & Michael Sweet
Graphics & Design by Ginger Riley & Andrea Schultz

alienware

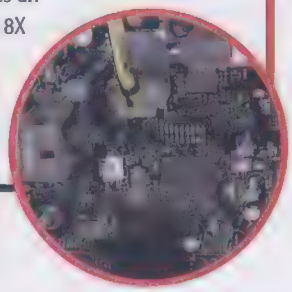
With its 200-point preship quality testing process, Alienware is famously meticulous. So meticulous, in fact, that the company skinned its teeth getting the system shipped to us in time for thorough testing, but it was worth the wait. Once the system landed, it won us over immediately. The detail sticklers at Alienware built an awesome green beauty fashioned after the predator from the "Alien" flicks and called the Area-51, with a full tower's worth of guts filled with heavyweight components, some not yet on the market.

The front of the case looks like a tall psychedelic steam engine, complete with elongated ventilation grilles along the bottom that glow with green light. A large door occupies the top front of the case and conceals the optical drives, floppy drive, and seven-in-one media card reader. All other ports are in the rear. On back, a removable grille made of durable black plastic lets you channel all connected cables through a single hole and thereby end cable clutter. Alienware also banished clutter from inside the case by bundling cables and tucking them out of harm's way.

The system's core burns with a fast pair of 3GHz Pentium 4 CPUs that crunch digits beneath a colossal heat sink/fan unit. (Continued on page 48.)

Motherboard

The Intel D875PBZ (Bonanza) motherboard includes an 800MHz FSB, 8X AGP, PCI Express, and SATA support.

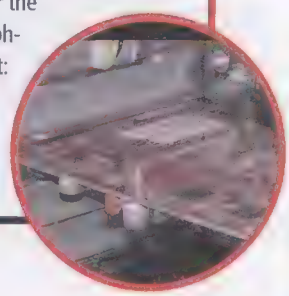


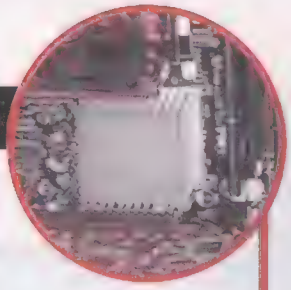
Memory

The Bonanza's two memory slots hold 1GB of lightning-fast DDR400 memory from Corsair.

Video Card

If you're looking for the current best in graphics, Alienware has it: ATI's new Radeon 9800 video card, an 8X AGP card with 128MB DDR.





Chipset

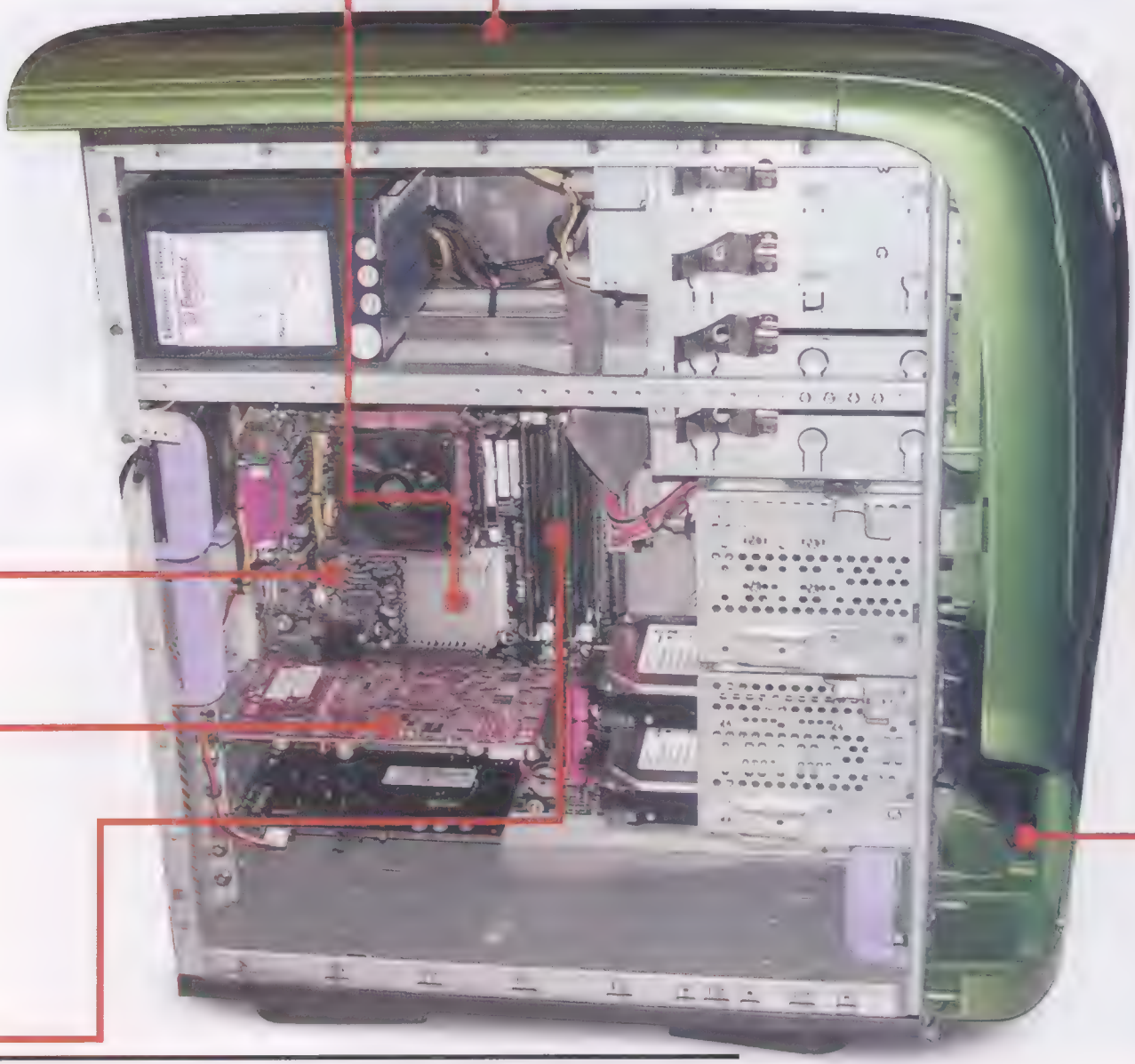
To prevent the Intel i875P chipset (code-named Canterwood) from overheating, Alienware topped it off with its own heatsink.

Fans

Three Antec fans simultaneously cool the chassis and glow a bright Alienware green; two are in front and one, covered by a pop-up Alienware logo, is embedded in the removable side panel.

Case

The "cyborg green" Predator case surrounds a full-tower chassis with room to further max out this already-packed system.



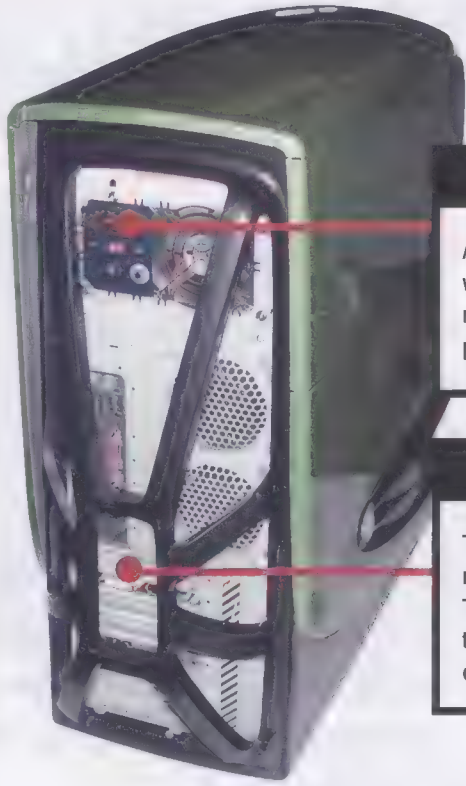
alienware area-51 specifications

Case	Cyborg green Predator tower
Power Supply	Enermax 550W
Motherboard	Intel D875PBZ (Bonanza)
Chipset	i875P (Canterwood)
CPU	3GHz Pentium 4 x2
Bus Speed	800MHz FSB
Heat Sink/Fan Unit	Huge heat sink/fan on CPUs; additional heat sink on chipset
RAM	1GB Corsair DDR400
Hard Drive	Seagate 120GB SATA x2 in RAID configuration
CD-RW Drive	Lite-on CD-RW
DVD-R/RW Drive	Sony DVD+R/RW/-R/RW
FDD	1.44MB floppy drive; seven-in-one media card reader
NIC/Modem	Integrated Gigabit NIC
Monitor	22-inch NEC FE2111SB
Video Card	ATI Radeon 9800
Sound Card	Creative Labs Sound Blaster Audigy2 Platinum eX
Speakers	Klipsch ProMedia GMX D-5.1
Keyboard	Green Microsoft Internet Keyboard
Mouse	Green Microsoft IntelliMouse Explorer 3.0
OS	WinXP Professional Edition
Software	Ahead Nero Burning ROM, ArcSoft ShowBiz, CyberLink PowerDVD, Roxio Easy CD Creator 5, Sonic MyDVD
Price	$3,797 (including $599 for the monitor and $299 for the speakers)

For a comprehensive specifications comparison chart, subscribers can go to **www.cpumag.com/cpumay03/leaders**.

alienware area-51 benchmarks

3DMark2001SE	16,691
3DMark03	5,601
PCMark2002	
CPU	7,103
Memory	8,921
HDD	1,213
Quake III	
1,024 x 768	305.8
1,280 x 1,024	285.2
1,600 x 1,200	235.4
AquaMark 2.3	
1,024 x 768	97.5
1,280 x 1,024	79.7
1,600 x 1,200	57.2
Unreal Tournament 2003	
1,024 x 768	114.4
1,280 x 1,024	115
1,600 x 1,200	114.5



power supply

An Enermax EG651P-VE delivers 550 watts of power through the Area-51, more than enough to satisfy the high-performance mobo and dual processors.

grille

This durable plastic grille lets you channel all the cables through a center hole. The grille is removable, which is a good thing because you have to take it off to open the case.

Underneath lies Intel's current mother of all motherboards: the D875PBZ (aka Bonanza). It includes the i875P chipset (code-named Canterwood), a mind-boggling 800MHz FSB, dual-channel DDR400 support (Intel now calls this PAT for Performance Acceleration Technology), five PCI slots, and an 8X AGP slot, plus USB 2.0 and SATA support. Two Corsair 512MB DDR400 modules occupy both memory slots for a total of 1GB memory.

Alienware took full advantage of the mobo's SATA support when it included twin Seagate 120GB SATA hard drives. The Area-51's Lite-On CD-RW drive is fast at 52X/42X/52X. The Sony DRU-500A is the sweetest optical deal of all; it supports both the +R/RW and -R/RW families of recordable DVD media. The media card reader handles seven formats: Compact Flash Type I/II, IBM MicroDrive, Memory Stick, MultiMedia Card, Secure Digital Card, and SmartMedia Card.

As with the other two systems in this review, multimedia reigns supreme in the Alienware. It includes ATI's new Radeon 9800, an 8X AGP video card with 128MB DDR. For our viewing pleasure, Alienware threw in a super-sharp 22-inch CRT from NEC. In the audio department there's a Creative Labs Sound Blaster Audigy2 Platinum EX card and a Klipsch ProMedia GMX D-5.1 SurroundSound speaker set with subwoofer. Additional highlights include a Microsoft Internet Keyboard and IntelliMouse Explorer 3.0 in matching cyborg green, an integrated Intel PRO/1000 Gigabit network adapter, a utilitarian software bundle, and WinXP Pro.

As the benchmark chart indicates, the system seared through our benchmarks like nobody's business. And as we expected, the Area-51 also performed well in our standard practical tests. DVD video looked and sounded flawless. And after popping in an audio CD, turning up the volume, and closing our eyes, the sound system transplanted us to a sound studio disconnected from space and time. Truth be told, the entire package drew us in from beginning to end, and we loved every minute of it.

falcon northwest

Falcon Northwest Specifications

Case	Cooler Master ATC-110 (Exotix Black with window)
Power Supply	Enermax EG365P-VE(FC) 350-watt
Motherboard	ASUS A7N8X Deluxe
Chipset	NVIDIA nForce2
CPU	AMD Barton 3000+
Heat Sink/Fan Unit	Cooler Master
RAM	Corsair PC2700 (512MB x 2)
Hard Drive	36GB WD360 Raptor 10,000rpm SATA (x 2)
DVD+RW Drive	Sony DRU-500AX
DVD Drive	Toshiba 16X DVD-ROM
CD-RW Drive	Plextor PlexWriter 48/24/48
FDD	Teac
NIC/Modem	Integrated
Monitor	22-inch NEC FE-2111SB
Video Card	ATI Radeon 9800 Pro
Sound Card	Creative Labs Audigy II Platinum eX
Speakers	Klipsch 7.1
Keyboard	Eluminx 104 keyboard
Mouse	Logitech MX700
OS	WinXP Home
Price	$22,295

Home Theater Components

Front speakers	Klipsch RF-7 Floorstanding Speakers x2
Surround speakers/Rear Surround speakers	Klipsch RS-7 Surround Speakers x4
Subwoofer	Klipsch KSW-15 Subwoofer
Center Channel	Klipsch RC-7
Preamplifier	Aragon Stage One Preamplifier/Processor
Amplifier	Aragon 2007 Amplifier
Projector	Sony VPL-HS10 projector

For a comprehensive specifications comparison chart, subscribers can go to **www.cpumag.com/cpumay03/leaders**.

When we asked Falcon Northwest to build a leading system for us, we told the company "anything goes, as long as it's high-end." Falcon Northwest took "high-end" to a totally new high with a creative system plan. The company went well above and beyond the call of duty, providing us with a PC that doubles (or perhaps we should say triples or quadruples) as a home theater system, using the very best equipment from Klipsch, one of the most respected names in audio hardware.

The Mach V that Falcon Northwest sent us is by far the most expensive system of the three, but most of that money (almost three-quarters of it) is tied up in its home theater gear. The PC, sans peripherals, is an almost down-to-earth $5,250. The Mach V uses AMD's rocket-fast 3000+ "Barton" CPU, which is nestled into the heart of an nForce2-based ASUS A7N8X Deluxe motherboard. Falcon Northwest included ATI's wicked-fast Radeon 9800 Pro video card and Sony's oh-so-versatile DRU-500AX DVD recorder. As cool as those components are, the Mach V's best feature (well, inside the case anyway) is the pair of 36GB, 10,000rpm WD360 Raptor Serial ATA drives from Western Digital.

Falcon Northwest does so much more than simply slap a lot of good hardware inside a PC. The system's cables and cords are neatly tucked away to improve airflow inside the case, and several pieces of strategically placed foam reduce the noisiness of the system. The case for our Mach V sports a gorgeous black metallic Exotix paint job featuring the Falcon logo

Falcon Northwest Benchmarks

3DMark2001SE	16,642
3DMark03	5,513
PCMark2002	
CPU	6,629
Memory	5,679
HDD	2,254
Quake III	
1,024 x 768	265.7
1,280 x 1,024	254.3
1,600 x 1,200	221.9
AquaMark 2.3	
1,024 x 768	100.1
1,280 x 1,024	80.4
1,600 x 1,200	55.9
Unreal Tournament 2003	
1,024 x 768	131.1
1,280 x 1,024	121.9
1,600 x 1,200	109.1

on one side. The system has a window and a pair of blue cold cathode tubes so you can see all the good stuff inside.

The real crown jewel of this system is the home theater equipment, which is worth an additional $16,600. The Mach V included a 7.1 speaker system composed entirely of Klipsch's Reference series speakers. We connected the impressive speaker system to an Aragon Stage One preamplifier/processor ($4,000) and an Aragon 2007 THX Ultra2 amplifier ($3,000) that Falcon Northwest included in the home theater package. We had to do a lot of wiring to set up this system. When we tested it, it thundered like nothing else we've ever heard.

Falcon Northwest included a 22-inch NEC FE 2111SB monitor with our system, but that's hardly sufficient for watching DVD movies. So the company sent us a Sony VPL-HS10 "Cineza" projector ($2,999), which can display a screen size from 40 inches to 300 inches.

We watched a DVD (OK, several of them) with this setup, and we were blown away by the sound and the video quality. Watching the "The Lord Of The Rings" with the Falcon Northwest setup was nearly as good as seeing it in the theater. Actually, it was better, because we didn't have a row of unruly kids sitting in front of us. We also watched "Terminator 2." Every time Arnie squeezed the trigger on his sawed-off shotgun, the boom rippled through the walls and through us.

The Sony Cineza projector is HDTV-compatible so you can get the full widescreen effect when watching DVDs. We were nearly as impressed with the quality of the Cineza's video as we were with the audio quality of the Klipsch speakers and Aragon amps.

We didn't limit ourselves to watching movies with the Falcon system, however. You can't let a home theater system like this slip through your hands without jamming your favorite tunes. We grabbed some CDs and turned up the volume. There's no way we could max out the speakers without destroying our eardrums. Not even close. The Klipsch Reference Series speakers are deafening, but they always retained their pitch-perfect clarity. These are really amazing speakers. The warmth and precision with which they make music is practically unparalleled.

This system isn't all about music and movies, though. It's a high-octane PC, so naturally we had to play a game. We fired up Unreal Tournament 2003. The game looked exquisite on the NEC FE 2111SB monitor, and the Radeon 9800 Pro cruised through the graphics at every resolution. Listening to Unreal Tournament 2003 through a Klipsch 7.1 sound system was totally surreal.

The combination of Falcon's best system with Klipsch's best speakers and Aragon's best audio equipment is almost more pleasure than we can bear. It's like driving a Ferrari while eating a filet mignon with Ali Landry riding shotgun. This is the way to set up a home theater.

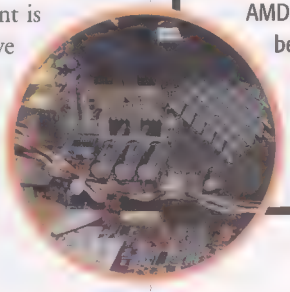
Case Window

The Mach V case includes a window so you can gaze at the precious internal hardware from afar.

Serial ATA drives

The Mach V's twin turbo Serial ATA drives ensure speedy data transfer, and the cables are neatly tucked out of the way.

Video Card/Heat Sink & Fan/CPU

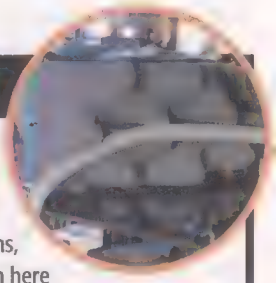


Here you can see the backside of the ATI Radeon 9800 Pro, which has its own power supply connection. Above it is the AMD Barton 3000+ CPU, hidden behind a Cooler Master heatsink and fan unit. Notice how all of the cables are tied down and pushed out of the way as much as possible.

Sony VPL-HS10 Cineza projector

Forget about 57-inch HiDef TV sets. If you really want the home theater experience, you need a projector. The Sony VPL-HS10 Cineza is one of the best and costs only a little more than a large-screen HDTV set.

Foam



A PC tends to get noisy when it's running several fans, but a little foam here and there will take care of that.

Case & logo

The silver falcon on the side of the case appears to change color as you move around. The black paint is so highly polished that it still looks wet.

Optical drives

Falcon fitted this Mach V with not one, not two, but three optical drives, the coolest of which is the Sony DRU-500AX.

The Klipsch Contribution

Klipsch is one of the most revered names in home audio technology. The company's been making top-of-the-line speakers for decades, and we feel pretty fortunate to hear the best stuff Klipsch has to offer first-hand. You don't have to listen to this system to know what it can do. One look, and you know you're going to be blown away.

Aragon Preamp/Processor & Aragon Amp

Perhaps the best combination since Abbot and Costello, the Aragon Stage One preamp/processor and the Aragon 2007 amplifier is the source of this system's home theater power.

Klipsch RF-7 Floor-Standing Speakers

The RF-7 floor-standing speakers may be the best in Klipsch's arsenal, which is saying a lot. The 250rms watt (and 1,000 watt peak power) speakers are tall and intimidating but sound beautiful.

Klipsch Surround-Sound Speakers

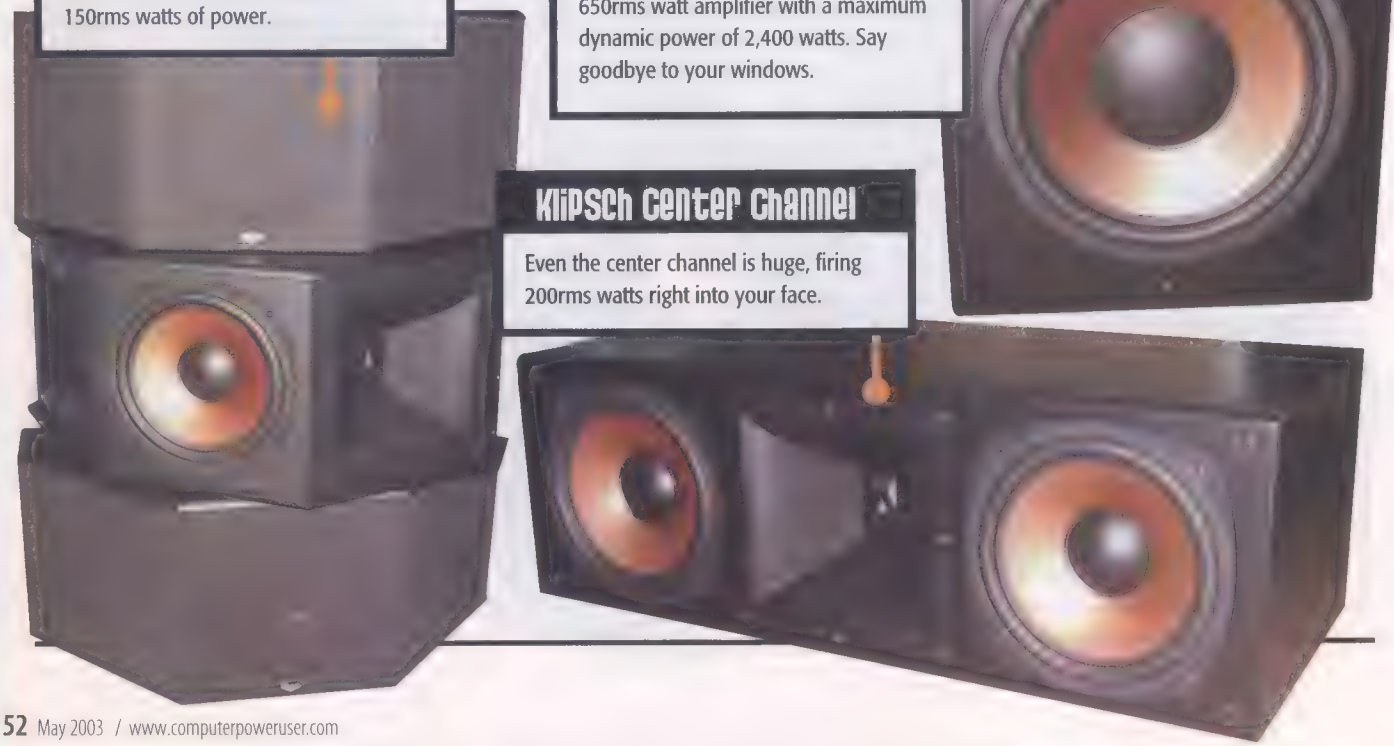
5.1 systems are so 2002. Real audiophiles step up to 7.1 sound, with two pairs of surround sound speakers such as these RS-7s, which serve up 150rms watts of power.

Klipsch Sub RSW-15

The massive RSW-15 subwoofer has a 650rms watt amplifier with a maximum dynamic power of 2,400 watts. Say goodbye to your windows.

Klipsch Center Channel

Even the center channel is huge, firing 200rms watts right into your face.



VOODOO PC

We knew we could count on Voodoo PC to whip up a system full of good mojo. Voodoo PC has been working its magic on power users for many years, and the F-Class system we received from the company put us under its spell right away. It has a dark, menacing look that seethes power. The case's exterior is shelled in Range Rover Black, as are several of the system's components. The white "Electric Veins" case lighting gives the system an eerie glow. But even though this PC is a looker, like the others in the pack, it's what's inside that counts.

The F-Class system, like the Falcon Northwest, uses an ASUS A7N8X Deluxe motherboard with an AMD 3000+ CPU and a gigabyte of PC3200 DDR SDRAM. Voodoo also outfitted our F-Class with a pair of 120GB Seagate Serial ATA drives. That's a lot of storage, and the Serial ATA connection will help accelerate data transfers. This PC is all about speed.

On the multimedia side, Voodoo PC gave us an ATI Radeon 9800 Pro video card and a set of Logitech Z-680 speakers, an excellent power user audio/video combination. Obviously the speakers aren't in the same league as those that Falcon Northwest sent us, but they're much, much more affordable, and they still sound great. Voodoo PC decided not to outfit our rig with a sound card. At first we were disappointed, but we gave the nForce2's integrated audio a try, and we were pleasantly surprised. We received a note with the system to connect the Logitech Z-680 speakers to the PC with a digital coax cable (included) rather than the usual three analog inputs. We did, and we discovered that the audio was actually really good.

The F-Class's design is hard to beat. The case sports Voodoo PC's distinctive "Eye of the Storm" window cutout and a cold cathode light to showcase the sweet hardware inside the system. The case's paint job feels as smooth as glass, and the system's speakers and monitors also have a fresh coat of paint. The metallic black Logitech Z-680 speakers look exceptionally cool. Voodoo PC also painted the drives' bezels rather than replacing them with simple black plastic

Voodoo PC Specifications

Case	Cooler Master AT C 210C-VX2
Power Supply	Enermax EG365P-VE
Motherboard	ASUS A7N8X Deluxe
Chipset	NVIDIA nForce2
CPU	AMD Barton 3000+
Heat Sink/Fan Unit	Swiftec heat sink; Panaflo fan
RAM	Corsair PC3200 512MB x 2
Hard Drive	Seagate 120GB SATA x2
DVD-ROM Drive	Lite-On 16X
CD-RW Drive	Lite-On 52/24/52
FDD	Generic
NIC/Modem	Integrated
Monitor	22-inch NEC FE2111SB
Video Card	ATI Radeon 9800 Pro
Sound Card	Integrated
Speakers	Logitech Z-680
Keyboard	Logitech Cordless Elite
Mouse	Logitech Cordless MouseMan Optical
OS	WinXP Home
Price	$5,400
Other	Eye Of The Storm window
	"Voodoo Electric Veins" light kit
	"Range Rover Black" paint finish
	Card Keeper
	Tribe-V fan grill
	Painted monitor, keyboard, mouse, speakers

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Voodoo PC Benchmarks

3DMark2001SE	16,666
3DMark03	5,535
PCMark2002	
CPU	6,640
Memory	5,894
HDD	1,477
Quake III	
1,024 x 768	269
1,280 x 1,024	259.2
1,600 x 1,200	224.2
AquaMark 2.3	
1,024 x 768	94.7
1,280 x 1,024	78.8
1,600 x 1,200	57.1
Unreal Tournament 2003	
1,024 x 768	122.9
1,280 x 1,024	118
1,600 x 1,200	107.9

bezels. The buttons on the drive are painted as well, and you'd be hard-pressed to find even a hint of stray paint creeping over the LED openings or any other part of the case where paint doesn't belong.

Voodoo PC is the best at hiding cables inside the case. Every single cable under this hood is pulled taut and tucked away to the point that they seem nearly invisible. The hard drive cables are folded origami style over each other and essentially pinned to the back side of the case interior. The main power supply cord is tucked away on top of the power supply, and the Serial ATA cables are buried behind the drives and the case fixtures so they're nearly out of sight. Some madman at Voodoo PC must have spent many long nights figuring out how to hide the system's internal cables this well. Not only is it aesthetically pleasing, it improves airflow inside the case, reducing the system's internal temperature.

Voodoo PC incorporated several nice little touches into the F-Class system we received. A Card Keeper retainer secures the video card so it won't come loose when the system is in transit. One of the fans has a customized Voodoo PC chrome grill, and the Voodoo PC logo also appears on the front of the monitor. There's not going to be any doubt where this system came from.

Monitor badge

The 22-inch NEC FE2111SB monitor gains a new identity with the addition of a Voodoo PC badge.

There's also no doubt that the F-Class excels at everything it does. To get a real feel for how this system handled, we watched DVDs, listened to CDs, and played a little Unreal Tournament 2003 on the system, and it performed beautifully each time. The DVDs we played looked sharp on the system's NEC FE 2111SB display, and the movie's audio sounded excellent through the Logitech Z-680 speakers, despite the integrated sound. The dialog and ambient noise was clear and well defined, and the Logitech Z-680's subwoofer added a satisfying rumble to the action scenes in the movies.

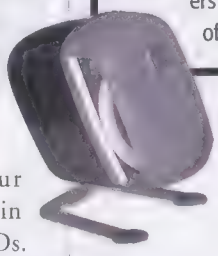
We pulled out several of our favorite CDs and gave them a spin once we were done watching DVDs. As we mentioned earlier, the F-Class didn't come with a sound card, and although that seems like an oversight to us for a high-end PC, the integrated audio really wasn't too bad. The music sounded clean, with rich bass tones. The higher frequencies were sharp and clear. We can't complain about the lack of a sound card in the F-class because the audio sounded fine to us in every test.

Finally, we took Unreal Tournament 2003 out for a short spin. The video quality of Unreal Tournament 2003 was identical to that of the Falcon Northwest system, which is no surprise because both systems use the same motherboard, CPU, video card, and monitor. The Logitech speakers hammered out the audio in the game with just as much gusto as they did when playing DVDs.

Voodoo PC may not have quite as much name recognition as Alienware or Falcon Northwest, but these people know how to design an excellent system. The finishing touches in this machine really stand out, such as the care with which the internal cables are wrapped up and hidden, the exceptional quality of the system's paint job (especially the drive bezels), and the Card Keeper to keep the video card in place. That's a sure-fire sign of a company that takes its work very seriously. Like Alienware and Falcon Northwest, Voodoo PC has earned its place among the leaders of the pack. CPU

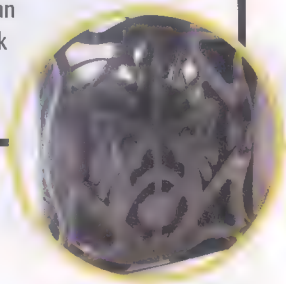
Speakers

Voodoo PC gave the five Logitech speakers a new look to match the rest of the system's color scheme.



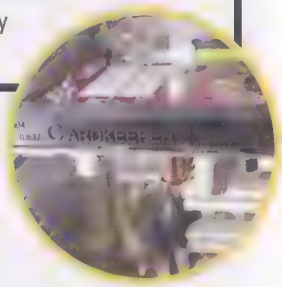
Fan grill

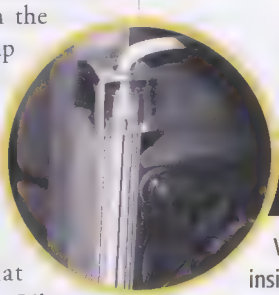
You'd probably miss it if you weren't looking for it, but Voodoo PC popped one of its own fan grills on the back of the system's exhaust fan.



Card Keeper

The Card Keeper: Don't go to a LAN party without it.





Cathode Light

Voodoo PC lights up the inside of the case with a bright white cold cathode tube.

Serial ATA Drives

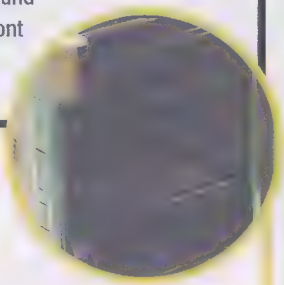
You can barely see the Serial ATA cables connected to the 120GB Seagate hard drives.

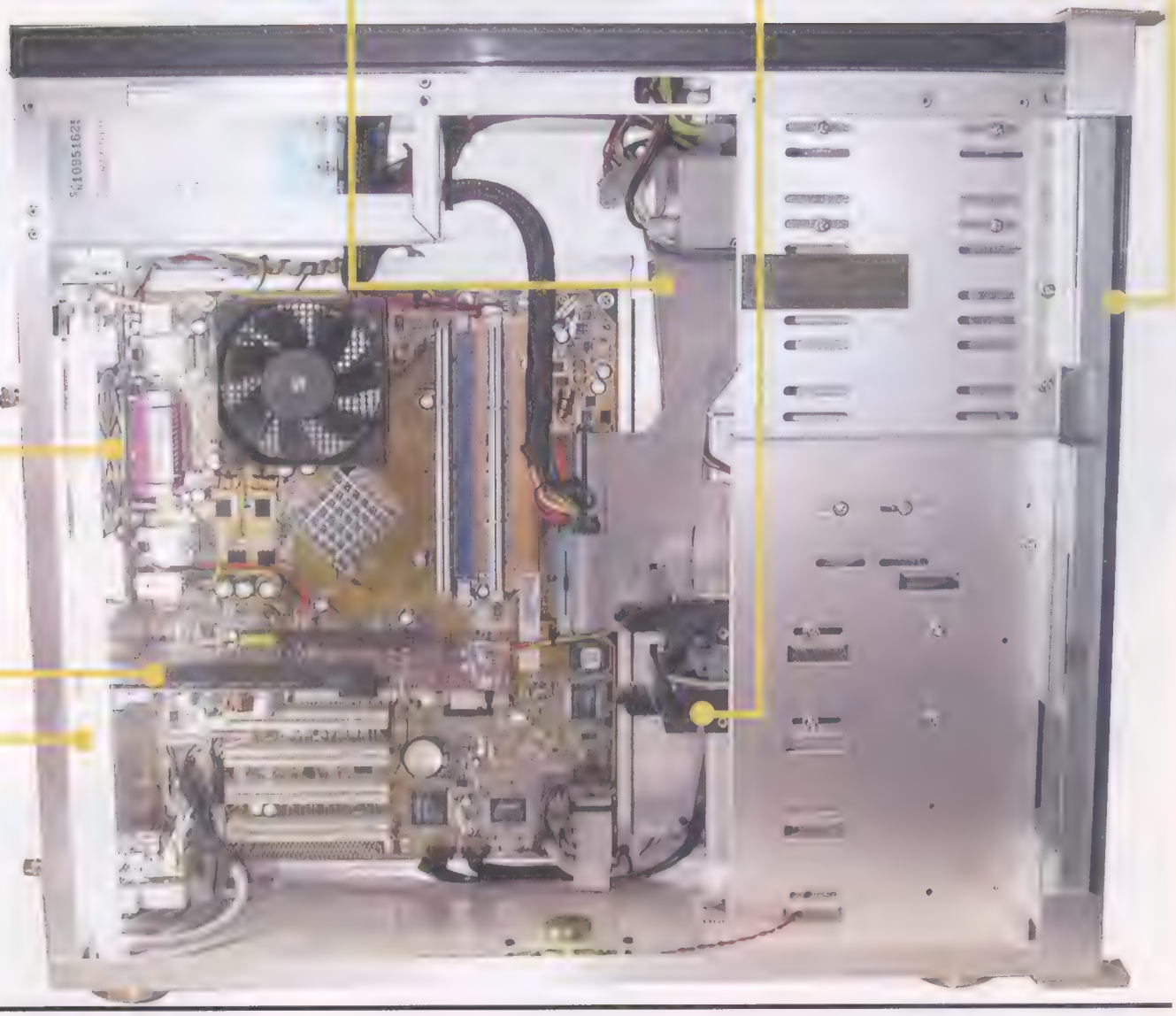
Cables

Every cable and piece of wire within the system is meticulously folded, wrapped, and tucked out of the way.

Optical Drives

No plastic bezels here. Voodoo PC went the extra mile and painted the front face of each drive.





Plextor PlexCombo. The CD-RW workhorse that plays movies and games.

PlexWriter 40/12/40A PlexWriter 40/12/40A PlexWriter 40/12/40A PlexWriter 24/10/40A

All day Biff Braxston has put his PlexCombo™ through its paces. Writing. Rewriting. Speed-reading. Happy knowing he'll never have to worry about buffer underrun errors. Audio pops. Or jitters.

Biff has a Plextor®, part of the drive family that has captivated IT and audio professionals with award-winning performance. The PlexCombo 20/10/40-12A has been a workhorse for Biff. "A good thing, but all work and no play can make me and my trusty drive a dull duo," Biff banters. Suddenly, he remembers PlexCombo is also a quality DVD-ROM drive. Biff is thrilled. His root beer is chilled. In goes the DVD flick. And fade to black.

What drives you to Plextor? For work and play, the PlexCombo CD-RW/DVD-ROM is a blockbuster. Catch Plextor's latest attraction at www.plextor.com.

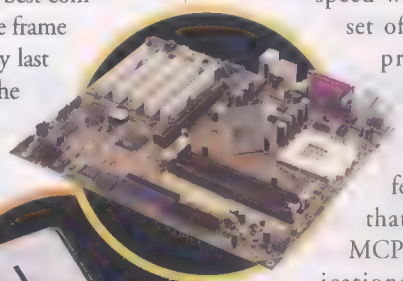
PLEXTOR®

your next PC's pieces

A Guide To The Best Components Your Money Can Buy

Power manifests itself in many forms, be it the Thrust SSC, the world's fastest car; an SR-71 flying at 2,200 mph; or France's high-speed train, TGV. Gauging the potency of a PC is a little more difficult, but we do our best to quantify performance with an array of benchmarks ideally measuring different models of usage.

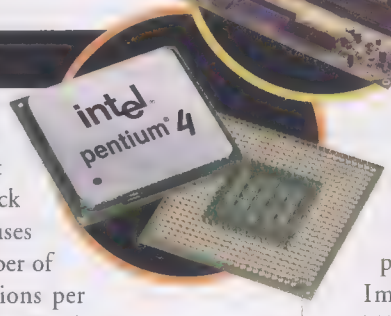
Gaming enthusiasts look to expensive video cards and powerful processors for deliverance. Video-editing gurus rely on nimble I/O subsystems. Home-theater buffs add an immersive sound system to the mix. Then there are those who choose the best components from every category, constructing a modern system built for insane frame rates with processing power to spare. Top-of-the-line bragging rights rarely last more than a month or two, but in this guide, we've compiled some of the best components money can buy; follow along and you can be reasonably sure the resulting PC will outlive J. Lo's next marriage.



processor

Intel 3GHz Pentium 4
(800MHz FSB)
www.intel.com

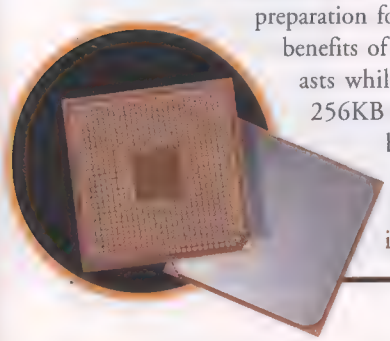
AMD Athlon XP 3000+
(333MHz FSB)
$560
www.amd.com



Intel continues to leverage the flexibility of its NetBurst architecture to attain faster clock frequencies, while AMD focuses on increasing the average number of successfully executed instructions per clock cycle to market its True Performance Initiative. Despite the diverging strategies, Intel and AMD have collectively recognized the importance of a balanced architecture in the quest for additional speed. So, we're seeing each manufacturer explore faster FSB frequencies.

Intel is officially moving to an 800MHz FSB with the Canterwood chipset (i875P). It's unclear how significantly the new bus speed will impact platform performance, but future P4 iterations will certainly be unbridled by memory-bandwidth shortages. The first processor to support the evolutionary step is expected to clock at an even 3GHz. Like the preceding 3.06GHz chip, such features as Hyper-Threading and a 512KB L2 cache will be included. In fact, the Northwood core will remain unchanged until Intel unveils Prescott later in 2003. We also hear Intel will extend Hyper-Threading technology down into several other models of the P4 family later this quarter.

Conversely, AMD recently added a 333MHz FSB to its repertoire in preparation for the Barton launch. AMD is said to be exploring the benefits of a 400MHz system bus to satiate performance enthusiasts while finishing touches are applied to Athlon64. Adding 256KB of L2 cache (512KB total L2) to its latest core has bought AMD some time, but the 2.17GHz Athlon XP 3000+ will ultimately need another frequency increase or two before the fall. For now, the Athlon XP 3000+ is the chip to own if your loyalty lies with AMD.



motherboard

Any Intel Canterwood
www.intel.com

ASUS A7N8X Deluxe
(nForce2)
$140
www.asus.com

Milking the most performance from a high-end processor often also means making a motherboard upgrade, as well. If you have been saving for an Athlon XP, you will want to get a mobo based on NVIDIA's nForce2 chipset. The ASUS A7N8X Deluxe does an exemplary job of blending raw speed with a comprehensive set of features. On top of proper support for 333MHz FSB processors and AGP8X, the A7N8X Deluxe features all the goodies that go with NVIDIA's MCP-T (Media Communications Processor-Turbo), such as six USB 2.0 ports, FireWire, six-channel audio with Dolby Digital encoding, and two 10/100Mbps Ethernet ports. ASUS also adds Silicon Image's Sil 3112A SATA (Serial ATA) controller with RAID capabilities to the mix.

Intel enthusiasts should look to the upcoming Canterwood chipset to deliver an equivalent intermingling of performance and features. Sporting two channels of 64-bit DDR400 memory, the platform delivers 6.4GBps of memory bandwidth. Naturally, AGP8X and Hyper-Threading are natively offered, while SATA with RAID support is being integrated onto a new ICH5 (I/O Controller Hub). Intel is removing its Gigabit Ethernet controller from the congested ICH to give the networking technology a dedicated 266MBps I/O link to the MCH (Memory Controller Hub). Beyond a historically conservative approach to platform performance, look for Intel to introduce its PAT (Performance Acceleration Technology), effectively reducing latency within the chipset.

memory

Our AMD and Intel platforms are signs of the times, as each uses dual-channel DDR memory aimed at balancing increasingly faster frontside busses and today's memory technology. A reliable implementation requires modules of comparable ability, though. With Intel, NVIDIA, and SiS evangelizing the bandwidth benefits of dual-channel memory operation, Corsair is looking to sell modules verified in a dual-channel environment, subsequently offering its TWINX family (Corsair validates TWINX kits on an ASUS A7N8X motherboard). Because the A7N8X Deluxe attains its best benchmark results at DDR333 speeds, we recommend Corsair's TWINX1024-2700LL kit, which includes two 512MB modules capable of 2-2-2 CAS (column address strobe) timings.

The situation is more complicated if you are looking at a new P4 operating on an 800MHz bus; it takes two channels of DDR400 memory to feed the chip 6.4GBps of bandwidth, so Canterwood makes it possible to match the chip's bandwidth appetite with a pair of DDR400 modules. Rather than going with the low-latency TWINX kit, consider a gigabyte of Corsair's XMS3500 memory, which will fare better in an overclocked environment.

Intel Platform:
1GB Corsair
CMX512-3500C2
DDR433 Memory x 2
$320

AMD Platform:
1GB Corsair
TWINX1024-2700LL
DDR333 Memory
$330
www.corsairmicro.com

Video Card

ATI Radeon
9800 Pro 128MB
$399
www.ati.com

ATI's relatively uncontested domination of the performance-3D market continues with its Radeon 9800 Pro. (See our review on pg. 22.) Architecturally, the new R350 VPU closely resembles the R300. However, ATI has reportedly made inroads with Hyper-Z, enhancing the chip's Z cache and revising its compression algorithms for more efficient memory bandwidth use. Expect retail 9800s to sport a 380MHz core. Meanwhile, memory on the 256-bit bus will operate at 340MHz, yielding 21.7GBps of bandwidth.

The result is a blisteringly fast card that put down 5,410 3D marks in 3DMark03. The card also moved through the Unreal Tournament 2003 demo on our 3GHz test system at 69fps in Flyby mode and 41fps in Botmatch mode with 4X anti-aliasing and 8X anisotropic filtering enabled at 1,600 x 1,200. The 9800 isn't a major departure from the Radeon 9700 Pro, but the 9800 series is certainly fast enough to usurp the troubled NVIDIA GeForce FX line. (See our FX 5800 review on pg. 23.) However, at $399, the 9800 is costly. There are still plenty of Radeon 9500 Pro cards selling for less than $200. With a simple BIOS update (www.3dchipset.com), you can significantly overclock the 9500 Pro, often matching the speed of a vanilla Radeon 9700.

Speakers

Without a decent speaker system onboard that's capable of playing 6.1-channel content, this particular Audigy 2 feature would seem like a gimmick, wouldn't it? Fortunately, Creative Labs has addressed its own conundrum with the MegaWorks THX 6.1 650 speaker system. The system sports a seven-channel amplifier with as much as 600 watts of burst power. Each of the system's six satellites includes a 3.5-inch driver, and the subwoofer has a single, down-firing 8-inch woofer. The system accepts analog inputs for 6.1-channel playback, along with an auxiliary analog input to interface with multiple sources. In addition, the system doesn't require an external decoder box, as the Audigy 2 can decode Dolby Digital EX on its own.

If you go with the SoundStorm, consider buying a speaker system with Dolby Digital and DTS decoding capabilities for the same price. Logitech's 500W Z-680 system comes with optical, coaxial, and six-channel analog connectors, plus much more. Like Creative's MegaWorks system, the Z-680 has earned THX certification for volume, fidelity, and build quality.

Creative Labs
MegaWorks THX
6.1 650
$399
($299 with Audigy 2)
www.creative.com

sound card

Creative Labs
Audigy 2
Platinum eX
$210
www.soundblaster.com

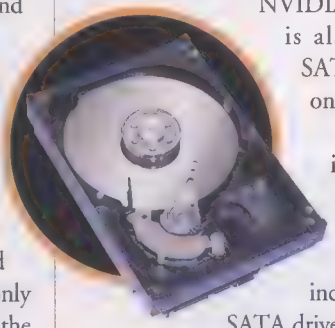
In December's *CPU*, we recommended Creative's Audigy Platinum eX for gamers and audio enthusiasts (see "The Pieces For Your Next PC," pg.54). Creative has since added the Audigy 2 to its arsenal. The silicon that powers it is very similar to the Audigy before it. Our one complaint with the Audigy was that Creative advertised 24-bit resolution and 192KHz sampling rates, but this was only available through a digital output. For the Audigy 2, Creative has enabled 24-bit digital-to-analog conversion during playback and recording with sampling rates of up to 96KHz in 5.1-channel mode using a Cirrus Logic eight-channel DAC. Consequently, Audigy 2 meets the hardware requirements for DVD-Audio playback, and thus, the necessary software support has also been incorporated. The card also works with Dolby Digital EX content, benefiting from a rear-center channel derived from the left and right surround channels. Finally, budding musicians will appreciate the ASIO2 driver that enables multichannel recording at 24-bit/96KHz.

Alternatively, an integral part of the nForce2 chipset is its SoundStorm audio processor. The A7N8X Deluxe offers 5.1-channel playback through digital and analog outputs. The NVIDIA sound processor also boasts Dolby Digital encoding. Although it doesn't offer the 24-bit resolution of the Audigy 2, SoundStorm is complete with features. If you're looking to save some money, consider using NVIDIA's integrated processor.

hard drive

Seagate Barracuda
Serial ATA V
120GB RAID 0
$190 x 2
www.seagate.com

Mobo makers have been incorporating SATA controllers into their products for months. Further, Intel will feature integrated support with its ICH5. SiS' upcoming 964 south bridge will offer similar capabilities, and NVIDIA's introductory Opteron chipset is also designed to accommodate SATA. The actual drives have been in short supply, and we're only now seeing limited retail availability.



Seagate is the first manufacturer out of the proverbial gates with its Barracuda Serial ATA V, available in 80 or 120GB configurations. Both models spin at 7,200rpm and are fed by an 8MB cache buffer. Already, SATA controllers, such as Silicon Image's Sil 3112 host chip, are enabling RAID capabilities for increased I/O performance. According to HDTach 2.61, a single SATA drive reads an average of 36.2MBps. A RAID 0 array of two 120GB drives boosts that to 57.7MBps, though CPU utilization increases by nearly 140%. For comparison, a 10,000rpm 146GB Seagate SCSI drive averages 55.7MBps. SCSI still holds a soft spot in our hearts, but the relatively lower cost and easy implementation of a SATA RAID array, not to mention the competitive performance, is hard to ignore. And SATA performance will only get better. Already, Western Digital has announced its 10,000rpm Raptor line, though those drives are aimed primarily at accelerating enterprise apps and will consequently be pricey.

networking

D-Link DI-624
802.11g-Draft
Wireless Router
$149

D-Link DWL-G650
802.11g-Draft
CardBus Adapter
$79

D-Link DWL-G520
802.11g-Draft
PCI Adapter
$79
www.dlink.com

For all of the attention Gigabit Ethernet commands, it's hard to deny the allure of wireless networking, especially with the IEEE finishing up 802.11g, which proposes extra security and as much as 54Mbps of throughput on the 2.4GHz radio band. Several manufacturers are already shipping networking hardware designed in compliance with a draft of the g spec, D-Link included. Michael Scott, D-Link technical marketing manager, anticipates that g will be finalized in a month or so, at which point D-Link's products will receive firmware and driver updates.

One 802.11g benefit is its backward compatibility with 802.11b products. D-Link's DI-624 will interface with older Wi-Fi equipment. The router also has a four-port switch. The DI-624 is easy to set up through a Web interface and can sustain a 54Mb connection even through drywall. The PCI and CardBus adapters involve a similarly straightforward installation. There isn't really a premium price associated with 802.11g, either. Purchased from D-Link's online store, two 802.11b adapters and the router would only save $20. 802.11g is clearly a compelling choice, unless you're concerned about RF interference on the 2.4GHz band.

display

ViewSonic p225f
22-inch CRT
$650
www.viewsonic.com

NEC LCD1920NX
19-inch LCD
$650
www.nec.com

Iiyama ProLite
4314UTG 17-inch LCD
$550
www.iiyama.com

Investing in a digital flat-panel is worth it if you can afford it. NEC's pricey LCD1920NX is a prime candidate for business types who don't demand snappy response times. If you want an LCD but can sacrifice some size, check out Iiyama's 4314UTG; it sports a 20ms response time for impressive gaming and movie performance, and it's about $100 less than the NEC unit. If you prefer a traditional CRT, consider ViewSonic's p225f, a high-performance 22-inch monitor with a maximum 2,048 x 1,536 resolution and 0.25mm aperture grille. It's best suited for CAD pros who demand an expansive workspace.

keyboard/mouse

Logitech MX700
Cordless Mouse
$80

Logitech Elite
Keyboard
$40
www.logitech.com

Logitech's MX700 cordless mouse sidesteps some problems we've seen with other wireless mice, mainly gaming-responsiveness issues. The MX700 has an 800dpi optical resolution, and latency has been greatly reduced, though it's still possible to confuse the device on reflective surfaces. The mouse powers through games and apps with ease, and it includes rechargeable batteries and a charging station. Key responsiveness, resistance, and placement seem to differ with each keyboard design. Logitech's Elite Keyboard, however, possesses extreme functionality and creature comfort. The Elite has many one-touch buttons for keyboard shortcuts, as well as an iNav scroll wheel.

Other Essentials

You'll also want a quality case and power supply. Consider an aluminum chassis with thumbscrews, mobo trays, and removable hard drive enclosures. Chenming (www.chenming.com) and Lian Li (www.lian-li.com) manufacture clean cases you can have modded with Plexiglas windows and cold-cathode lighting. Buy a reputable power supply, such as an Enermax unit (350- or 430-watt versions). If possible, consider a DVD burner. (See April's *CPU* Spotlight section for more on DVD burners.) ASUS sells a slick 4X DVD-R (DRW-0402P) for about $200. For about $350, the DRU500AX from Sony offers DVD+R and DVD-R recording ability. The systems we've configured should remain modern even after Intel releases its 3.2GHz P4 and future video cards add 50fps to our Quake III tests. Balance is the key. Don't starve a powerful processor with a 128MB memory module. Similarly, a Radeon 9800 Pro will only go so far if a 650MHz Athlon is backing it. Making informed decisions may mean the difference between playing Doom III or buying a new system later this year. CPU

by Chris Angelini

A Look To 2003's Second Half

AMD's Athlon64 will be one of the most significant releases later this year, heralding a long-awaited introduction to the K8 architecture. Expect the first Athlon64 to operate at 2GHz and have a rating around 3400+. For now, AMD will focus on its Barton core. Expect the Athlon XP to transition to a 400MHz FSB soon, and NVIDIA claims its nForce2 chipset will support the faster setting if and when the move happens. Intel's Prescott core will also emerge later this year, sporting 1MB of L2 cache, 13 new instructions, improved Hyper-Threading technology, and a 90nm manufacturing process. By propagating platforms with support for an 800MHz FSB today, Intel is effectively laying the groundwork for Prescott, which will utilize the same FSB speed.

We anticipate a slew of new chipsets as Athlon64 comes into its own. VIA's K8T400, SiS' 755, and NVIDIA's Crush K8 are all in the works, as is the memory architecture the K8 architecture will rely on. Damon Muzny of AMD's public relations department points out, however, that 64-bit hardware won't reach its potential without a supporting software infrastructure.

"Launching the AMD Athlon64 processor in September allows AMD to better align it with the availability of 64-bit operating systems and software applications when the Athlon XP's performance is superceded as our flagship," he says.

Rumor has it NVIDIA will be playing an aggressive game of catch-up with its NV35 GPU. ATI isn't sitting idle, though. Chris Evenden, ATI director of public relations, maintains, "Our dominance at the top end allows our engineers to completely focus on delivering the fastest cinematic visual processors without looking over their shoulders." ATI's engineers have proven themselves with the R300, so the competition between ATI and NVIDIA should remain heated throughout 2003.

Give *your* car the luxury of satellite navigation.

The StreetPilot® III from Garmin has features found in expensive in-dash navigation systems, plus one very important quality the others don't have. StreetPilot III is portable, so you can have the best in GPS navigation in any car you drive. Look up addresses, attractions and other services, and StreetPilot III will create a route and provide turn-by-turn directions with voice prompts to get you there.

StreetPilot III and GPS V from Garmin. Navigation for every car.

GARMIN® www.garmin.com NASDAQ **GRMN**

Available at: BEST BUY CompUSA

The Bleeding Edge Of Software

by Warren Ernst

Graphics & Design by Sonja Warner, Jason Codr & David Fiala

Inside The World Of Betas

Official product name: Dawn
Version # previewed: 5.02 beta
Publisher: Boris Zakharin
Developer and URL: Boris Zakharin; www.joshie.com/projects/dawn
ETA: Q2 2003
Why you should care: If your address book is keeping you from upgrading, wait no longer.

Dawn 5.02 beta

Are you using the same email program you've been using since 1993, only because you can't transfer the 638 email addresses in your address book to another program? Does your PDA's address book not play nicely with your favorite email client? If your answer to either question is yes, you need Dawn.

Essentially, Dawn is an address book importer/exporter, but it has abilities far beyond this. For example, it actually interfaces directly with Palm Desktop, Outlook, and several other program APIs to get at information you couldn't otherwise export. Similarly, the app can get information *into* some programs that lack an import function. The program roster includes Pegasus Mail, Mozilla, Outlook Express, Outlook 98/2000/2002, Pine, Opera, Corel WordPerfect, and Simeon/Execmail.

Some programs do have perfectly serviceable import/export functions, and Dawn can deal with those, too. Dawn can import/export plain text, Netscape 3, LDAP, CSV, Juno, and Becky files, and odds are your program can deal with *one* of these.

Dawn is especially handy when you want to *combine* addresses from different sources, such as 200 addresses from Netscape and 110 from Outlook Express, and then want them in Excel or a database for a master mailing label list.

The latest beta version adds support for a few more file formats, along with nested folder support, but there are a few more bugs than the last beta I used. More positive is that when the program is finished, it will still be free. ▲

foobar2000 v.57b

"Less is more" and "When everybody zigs, zag" come to mind when using foobar2000 to play music files. In an era when most MP3 players are adding video players and supplementary skinning engines, foobar is a refreshing change. "Minimal interface" doesn't even begin to describe it. We're talking practically no interface.

Imagine a window with a list of songs. No button bar with commands. No dancing lights. No VU meters or waveforms. Even the pull-down menus lack keyboard shortcuts. What you do get is stellar sound; sound some audiophiles claim is better than Winamp or others (though I couldn't hear it). You also get a light footprint (foobar takes up less than 2MB), and for Win9x folks, it requires almost no system resources.

The program gives you tons of options and a platform many developers have taken a liking to, which means new features and modules become available all the time. Want to reprogram the hotkeys? It's built in. Rip CDs? Built in. DSP effects and altered bit-rate output settings? Built in.

CPU utilization is still a little on the high side, and foobar seems to hit the drive for file input a lot more than other programs. There's also the occasional freeze, but then again, this is a very early beta. Stay tuned for what may be a revolutionary MP3 player. ▲

Official product name: foobar2000
Version # previewed: v.57b
Publisher: Peter Pawlowski
Developer and URL: Peter Pawlowski; foobar2000.hydrogenaudio.org
ETA: Q3 2003
Why you should care: If other music players don't do it for you, this one might.

Tag&Rename 3.0 beta2

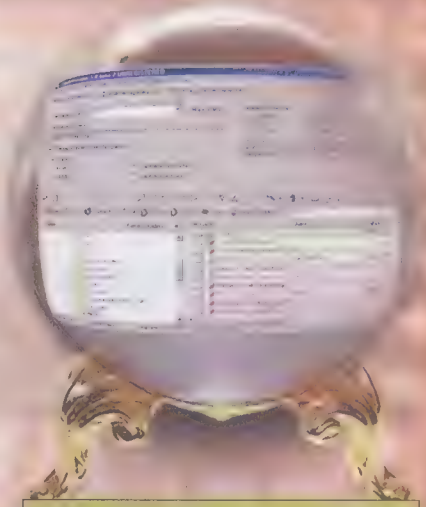
The best software is often the kind a programmer writes to solve a personal need, and then after the software evolves awhile, someone says, "Hey, I bet there are others who could use this." Such software is usually *stuffed* with features and frequently has a different look and feel compared to similar programs, reflecting the author's personal needs. Tag&Rename is such a program.

Tag&Rename makes organizing a huge library of MP3s (or formats, such as WMA and Ogg Vorbis) more of a treat than a chore. Tag&Rename's suite of tools help automate renaming and retagging your music. The most common chore is adding tags to a "probably correctly named" file. In this case, T&R can read the artist and title from the filename (in any order you specify) and copy the info into the correct fields using ID3v1 and v2 formats. The app automatically truncates large text fields for the v1 tag but keeps long names for the v2 tag. You can also associate an album cover and lyrics sheet to each song.

Conversely, if you have a song with the correct ID3 tags but wrong filename, T&R can rename the file automatically, in almost any format you wish. For example, if you want the track number to precede or follow the artist/title group or if you want to automatically capitalize names or replace the "_'s" with spaces, T&R will do it.

The album features are especially nifty. Suppose you have an entire album of songs, but the tags and filenames are all wrong. You can browse albums from All Music Guide (www.allmusic.com), select one, and have T&R rename and retag all the files in a folder.

There are literally dozens of nice touches throughout T&R, and once the smaller bugs get quashed in the beta, this may be the best tool available for managing music files. ▲



Official product name: Tag&Rename
Version # previewed: 3.0 beta 2
Publisher: Softpointer
Developer and URL: Softpointer; www.softpointer.com/tr.htm
ETA: Q2 2003
Why you should care: Perhaps the best music-tagging software available.

bookkey 0.93 beta

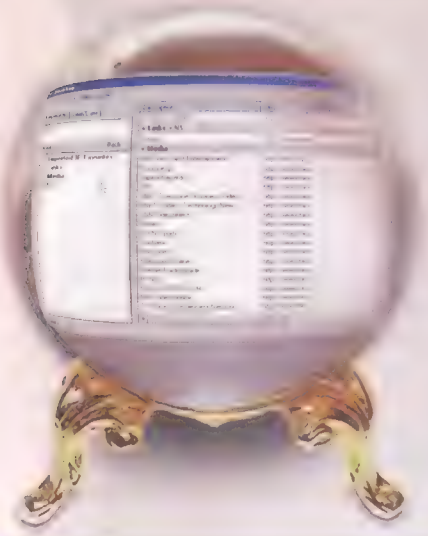
If you routinely use several Web browsers, you know how annoying it can be to click Bookmarks or Favorites and not be able to find the link to a site you just visited yesterday. Similarly annoying is trying to categorize the few thousand bookmarks you've saved.

The author of bookkey must have felt the same way and decided to do something about it, creating a program that works with IE, Netscape/Mozilla, and Opera. bookkey quickly and almost painlessly imports bookmarks from these browsers into one place. It also allows for quick filtering via typing keywords into the Text To Search For field on the Text/Dates tab. As if by magic, and a lot like Kaylon's excellent Powermarks, bookmarks appear quickly, without having to navigate through endless folders.

Also like Powermarks, bookkey organizes bookmarks by keywords—either those it manages to divine itself or those you enter. This is much more flexible than using folders because you can add multiple keywords to a bookmark. For example, add "shopping" and "computers" keywords for a favorite online computer store instead of putting the bookmark in a Computers or Shopping folder.

bookkey's interface is slightly different than you might expect. While the program is running, a triangle floats at the top of the screen. Drag a Web page to it to add a bookmark or click the triangle to bring up the main bookkey window. It works well.

Little issues belie the program's beta status. The program confused Opera 6 for Netscape when importing bookmarks, and its exporting functions are a little weak. However, there's a lot of usefulness in this little tool, and I'm looking forward to the magic 1.0 release. ▲



Official product name: bookkey
Version # previewed: 0.93 beta
Publisher: Michael Valentiner-Branth
Developer and URL: Michael Valentiner-Branth, www.bookkey.com/index.htm
ETA: Q2 2003
Why you should care: A good app if you've outgrown your Web browser's puny bookmarking tools.

Send Us Your Betas

Know of software in the beta stage that's deserving of some attention? Let us know. We'll take a look at it and possibly give it a go-round. Send your prospects to bleedingedge@cpumag.com.

UP TO SPEED

Upgrades That'll Keep You Humming Along

The gremlins that tweak our hardware drivers and fix and upgrade our software have been banging away in their mines to deliver a good helping of essential updates. Here's an eye on the nuggets they've uncovered

Driver Bay

Radeon Catalyst 3.1

Radeon owners who were disappointed with the first DirectX 9-ready video drivers—the Catalyst 3s for the Radeon family—will want to try the improved Catalyst 3.1. Running on a Radeon 9700 Pro, we had less trouble with DX9 demos (available at ATI) and saw smoother OpenGL gaming. ATI claims substantial performance increases, as well as 16-bit full-screen antialiasing support. We can't say we saw better speed, but overall stability seemed better. There's also an upgraded ATI Control Panel app and new video-capture drivers for All-In-Wonder version owners.

Get it at: www.ati.com

Sound Blaster Audigy2 Fixes

Audigy2 owners should run, not walk, to the Sound Blaster Web site to pick up several substantial updates, including the fully updated driver pack (dated 2/11/03 and WDM-approved), which smoothes over front-panel headphone issues and adds support for dual processors and Hyper-Threading modes. Also, get the bug-fixed MediaSource player, DVD-Audio Player, Speaker Settings console, and Surround Mixer, all in separate files. The Speaker Settings console now synchs better with WinXP's Audio Properties settings, and the speaker tests now play in a more natural clockwise sequence.

(Here's an upgrade tip for Audigy2 owners: If you suspect a conflict between older and newer Creative Labs drivers, or you just want to ensure the cleanest uninstall of old drivers, use the special driver cleaning utility buried in the Audigy2 installation CD. In the Audio\Drivers folder, use the CTZAPXX.exe program to initiate the uninstall.)

Get it at: www.soundblaster.com

VIA Hyperion 4in1drivers, ver. 4.46

If you haven't updated your VIA-based motherboard with the latest 4in1 4.46 drivers, you may be sacrificing some hard drive and AGP video performance, says the chipset provider. We've found that keeping our 4in1s current guarantees the best mobo compatibility with updated video drivers. For the record, the "four" drivers involve IDE bus mastering, the AGP interface with video drivers, IRQ routing (Win98 only), and an INF driver to identify your chipset properly to Windows. In late 2002, 4in1 officially became VIA Hyperion 4in1 drivers, and VIA claims substantial performance gains from the latest set, especially in 3D video speed. VIA says the Hyperions work with all its chipsets—AMD- and Intel-based—but check the site for compatibility details.

Get it at: www.viaarena.com

Upgrade Central

Lavasoft Ad-aware 6.0

Ad-aware fans panicked late last year with rumors that older Ad-aware versions wouldn't be updated. However, version 6 is now available in freeware and premium versions. The engine has been rebuilt to ferret out even sneakier spyware invaders, and an integrated auto-update feature grabs new reference files from the Web site more efficiently. Gone from the free version is the progress indicator.

Get it at: www.lavasoftusa.com

Netscape 7.02

Two decimal updates since the release of Netscape 7 last year have added some invaluable functionality that Internet Explorer only dreams about. Included in the 7.01 update is a pop-up window control that suppresses some pop-up ads via the security control. There is also a Home Page Group function that lets you open Netscape with multiple default home pages loaded into tabs. The 7.02 update increases stability and security and also bundles the latest Flash and Java plug-ins.

Get it at: channels.netscape.com/ns/browsers

J. River Media Center

With version 9, the old Media Jukebox media player becomes the J. River Media Center, and it should be finalized as you read this. A 30-day beta is available otherwise. More than a simple upgrade, this very sophisticated player adds support for multiregion DVD playback and TV-in features, including digital video recording functionality. You can organize digital image slideshows with audio soundtracks, create audio visualization and CD labels, and schedule recordings. Media Jukebox 8 owners have to buy into the full $39.98 package here, however.

Get it at: www.mediajukebox.com/mediacenter

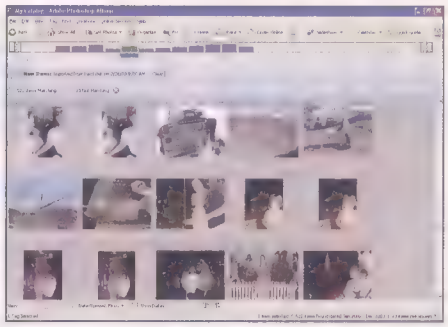
Lava Software PC-Mac-Net FileShare 2.2

This handy app makes easy work of transferring files between Macs and PCs, either via a LAN or the Internet. The 2.2 update increases network performance and the size of local and remote file lists. Also bigger is the font size when running under Mac OS X.

Get it at: www.lavasoftware.com/fileshare.html

by Steve Smith

Adobe Photoshop Album



Photoshop Album
$49.99
Adobe
www.adobe.com

Digital camera owners know that with taking pictures comes the task of organizing them. The tools Windows includes, and cameras themselves, usually don't do the job.

Photoshop Album does help organize your digital shots, plus touch up and share them. Compared to Picasa, it's a behemoth. Picasa requires 50MB of hard drive space and takes seconds to install, PA requires 256MB and has a time-consuming installation. PA has the features to match its girth, but it can be slower and less easy to use than Picasa.

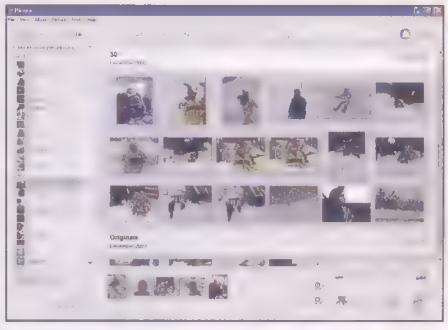
In addition to searching your hard drive for images and importing photos from a digital camera, PA can scan photos (this didn't work for me, turning up an uninformative error message instead). The app's photo editor includes cropping and red-eye removal, and there's a Single Click Fix feature for color, contrast, and sharpening. Results generally weren't as pleasing as Picasa's. There are also manual tools for correcting color, brightness, and contrast. Like Picasa, these are simple tools, not a full-fledged editor. (PA does integrate with Photoshop Elements, however.)

The program's flexible Creations Wizard lets you print an album, slideshow, greeting card, email card, or monthly calendar. You can also order a customized photo book or prints from Shutterfly.com. A cool PhotoCD function can burn a VCD slideshow with music that you can view on most DVD players. A calendar tool shows your photos in a wall calendar layout with images in date boxes to show when they were taken. The Adobe Atmosphere 3-D gallery is useless feature creep, however.

PA's Find functions are anything but useless, helping you select images taken within a certain time period or those with similar colors to a particular photo. PA is a great photo-management app. The learning curve is steeper than with Picasa, but several of its features are exceptional.

by Kevin Savetz

Lifescape Solutions Picasa 1.5



Picasa 1.5
$29.99
Lifescape Solutions
www.picasa.net

Picasa makes working with even hundreds of pictures almost effortless. With it you can sort, edit, print, and email your pictures. In addition, its interface is elegant, simple, good-looking, and intuitive. I didn't even have to glance at the comprehensive help files.

The program starts by searching your hard drive for images. (You can use the app while it's searching—a nice touch.) It then sets up Watch Folders and automatically updates its catalog whenever you add pictures. The app can also import images from your digital camera.

The main Album View lets you sort images by date, write descriptions, and assign keywords. Other views let you peruse pictures in a scrolling timeline or a slideshow complete with MP3 music. A picture editor lets you crop and rotate images and repair red-eye. A one-click Enhance feature does a fantastic job of correcting color and contrast, turning muddy pictures into images you'd be happy to put in a photo album. A sharpen tool would be a welcome addition, however.

When it's time to make prints, Picasa will oblige by printing to your printer or offering up a photo-printing service. If you print photos yourself, you can choose any size from a single 8- x 10-picture to a contact sheet of 42 tiny images. Lifescape Solutions won't say which photo service it uses to order prints, but the program's integrated ordering tool keeps a running total of an order's cost. You can also email pictures or export an album as a Web page, using various templates or XML.

There is room for improvement, though. Picasa doesn't support the .PNG file format, and you can't create a CD of pictures directly from the software. Picasa also crashed once during testing for no discernable reason. Overall, though, Picasa is a stellar photo-management program.

by Kevin Savetz

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

Holy Hollywood!

An Extreme Close-up On Six Video Editors

Being a digital videographer is no longer expensive or even difficult. The necessary hardware might only cost you $300 or less, and the expertise needed is at least drag-and-drop easy. You might not become a star director, but you can at least show off your creations to friends, family, and, if you get good enough, make some money with your visual wizardry—provided you have the right software.

Two years ago, Adobe Premiere reigned as king of the PC video editors. That hasn't changed, but Ulead gives Adobe a good run for its money. But it's at the lower end that the landscape has improved drastically. Until recently, entry-level editors that were made for simplicity produced results just above PowerPoint presentations. Today's low-end editors perform amazing new functions that should leave any self-doubting user convinced she can make movies worthy of public display.

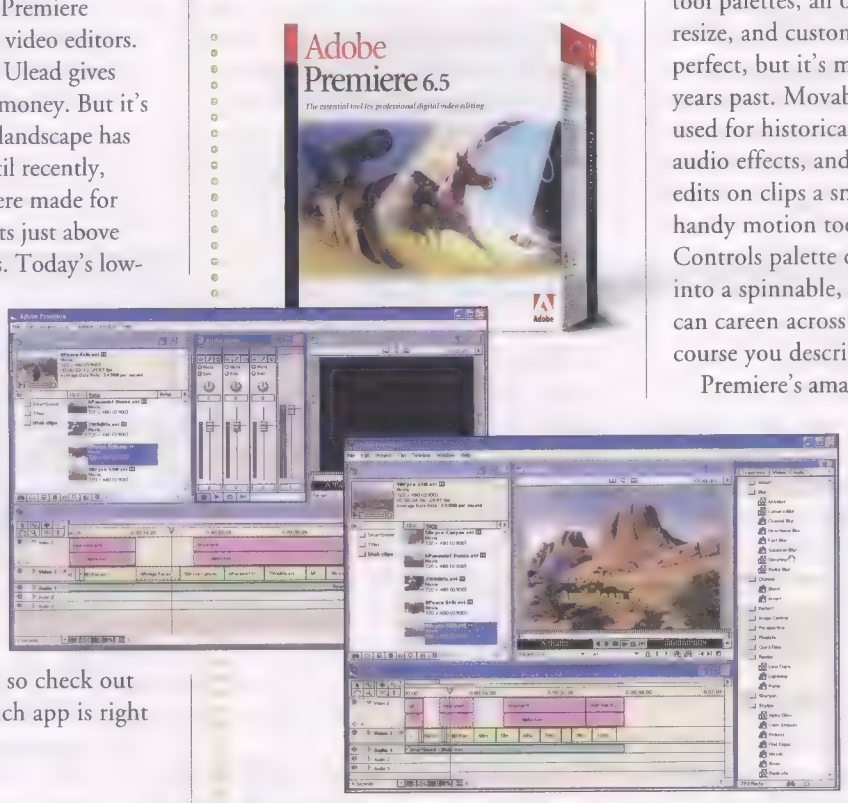
We examined six of today's hottest video editors, and all of them impressed us. However, there's no one-size-fits-all product, so check out our findings and see which app is right for you.

What You Need

At minimum, you need a 500MHz Pentium III or equivalent, 128MB of RAM, and at least 4GB of available drive space. In our tests on machines at the lower limit, we encountered significant rendering and preview delays. For higher-end apps, consider at least 2GHz and 256MB, plus a separate "scratch disk" devoted solely to video editing. Note that MediaStudio Pro supports Intel's Hyper-Threading technology for a significant performance boost, a feature you should see permeate all prosumer and mainstream editors soon.

Adobe Premiere 6.5

Adobe Premiere is the perfect example of a prosumer app. With some work, Premiere is within the reach of an average user's skills, but Premiere's capabilities are on par with many pro editors. You wouldn't use Premiere to edit a full-length Hollywood film, but it would (and does) work nicely for slick TV commercials.



Premiere is famous for having the consumer market's most complex editing interface, replete with multiple audio/video tracks, preview panes, and tool palettes, all of which you can move, resize, and customize. The layout isn't perfect, but it's more intuitive than in years past. Movable, tabbed palettes used for historical undos, transitions, audio effects, and more make direct edits on clips a snap. For example, a handy motion tool on the Effect Controls palette can turn a video clip into a spinnable, distortable object that can careen across the screen along a course you describe.

Premiere's amazing capabilities are many, but one factor that sets it apart is its outstanding keyframing capabilities. Keyframing consists of setting markers on the video timeline to note the state of certain effects. For example, you can start a flare effect at the five-second mark, conclude it at 10 seconds, and Premiere lets you view the effect's progress at each frame in between. Similarly, most editors let you fade an audio track's volume in and out, but Premiere lets you set nodes throughout an audio clip to adjust its level at any time, however you like.

Premiere 6.5
$549
Adobe
www.adobe.com

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

One of version 6.5's most significant additions is a move to real-time rendering. This addition lets you apply one or several effects to a clip or try a new transition and then immediately view the results in a preview window. Faster hardware subsystems enable this capability. Slower systems may still require rendering, however.

Also new is the revamped Title Designer, which spans a wide range of fonts and text effects straight out of Adobe Illustrator to make your movie titles look tasteful or eye-catching. Premiere is also seamlessly cross-compatible with Adobe's full prosumer software family, including Illustrator, Photoshop, and After Effects. You can even export a series of frames to Photoshop, edit them individually, and import them back to Premiere, a process known as rotoscoping.

Adobe makes extensive use of templates, but better still is Premiere's formidable lineup of audio tools, covering such tasks as volume leveling, user-specified spatial reverb (you supply the room size and other factors), and a standalone Sparkle LE tool for two-track waveform editing. A nice audio toy for consumers is the SmartSound Maestro, a wizard that helps build a soundtrack with bundled Quicktrack clips, according to your choice of mood, style, and duration.

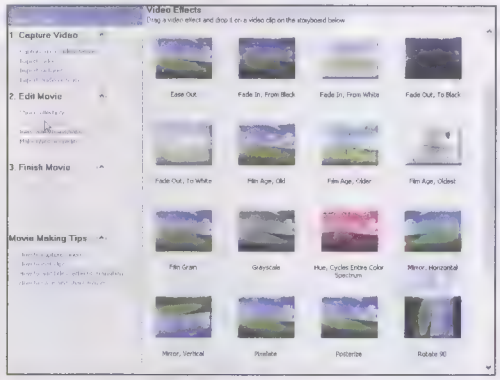
Beyond editing, Premiere's import/export features are top-notch, and 6.5 now supports handling of Windows Media. A new MPEG encoder in this version quickly burns VCDs and DVDs straight from the timeline. If you want to add menus and other DVD-class features, turn to Sonic's DVDit! LE, which bundles with Premiere.

Adobe throws everything but the kitchen sink in this package, making its purchase price quite reasonable. Furthermore, Premiere's online support and user base ensure you'll never lack for tips and tricks to improve your video craft. If you're willing to invest the time to hone your skills, this may be the only editor you'll need.

Microsoft Windows Movie Maker 2

Microsoft has surpassed itself and delivers a surprisingly good entry-level editor in Movie Maker 2, now officially a Windows XP component. If you have no editing budget or simply want some experience before buying a retail product, start here. In fact, once I delved into its full range of features, I sometimes found myself opting for MM2 over more robust editors because it could throw together a decent movie sequence faster than any other editor on my shelf.

MM2 starts with a simple interface designed for any user. Along the left is a Movie Tasks pane, which breaks down the video process into Capture, Editing, and Finishing (export) segments. A fourth segment, Movie Making Tips, essentially offers how-to advice on the other segments, plus more on transitions, effects, and such.



Movie Maker 2
Free
Microsoft
www.microsoft.com

The capture process involves plugging in a FireWire-enabled DV camera, watching a device detector window pop up, and letting Windows do its thing. The app's Capture Wizard assists in grabbing footage from non-DV sources. One cool feature is built-in scene-detection intelligence for recognizing scene breaks in analog footage and creating corresponding clips. This is huge for anyone still working with non-digital video. Also worth noting is that Microsoft no longer binds you to the Windows Media format. You can now export in DV AVI format, plus tell the Capture Wizard to import AVI or many other profiles, depending on system and connection bandwidth. Note, though, that using Windows Media 9 for capturing lets users leverage VBR (variable bitrate encoding) if a decent balance between space and quality is needed.

Although I'm not reviewing Microsoft's new Plus! package here, I'll point out that it offers a sweet Photo Story feature for Movie Maker users that's similar to the Motion Effect tool in Premiere, letting you set points within a still image. Photo Story then zooms in on the still image and moves between your two points, essentially animating the image. You can insert several of these with cross-fades for a quick, movie-like slideshow you can email or import back to MM2 as part of a longer project. Most low-end editors merely let you use static still images inserted between video clips, an effect I've always disliked.

MM2 puts more than 130 titles, transitions, and effects at your fingertips. Simply drag these into the timeline area where two clips overlap. If you're used to working on two video tracks to manage transitions, you'll love how that cross-fade duration is simply a matter of dragging one clip over another. The area where they overlap on the timeline establishes how long the cross lasts. I wish Microsoft would add the ability to more finely tune transitions and effects. Microsoft could have also integrated more 3D effects, although the company is perhaps saving this eye candy for Longhorn.

AutoMovie is another cool feature. With it, MM2 does its usual routine with breaking a new video into several clips. You pick the clips you want in

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

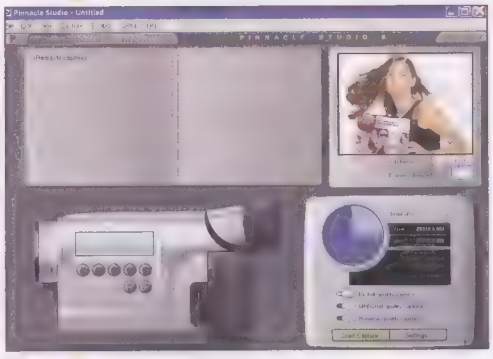
your finished movie and select one of five profiles (such as Music Video or Old Movie) that are essentially templates for average scene length, effects, and other variables. Provide the final movie's duration, and MM2 analyzes the footage and does all the work. Supply a music file for the soundtrack, and AutoMovie will synchronize your project with the music's tempo and rhythm. Because the AutoMovie analysis is saved, you can quickly create a new movie based on a different file without repeating all the processing.

MM2's titling isn't up to Adobe's Title Designer's level, but there are a few nifty titles mixed in. The effects are basic but look decent, considering Microsoft is aiming for drag-and-drop simplicity. When your movie is done, you can export it to the Web, email, disc file, CD, back to the DV camera, or into one of three profiles optimized for display on Pocket PCs. However, there's no DVD-burning capability, even if you've paid for a third-party MPEG pack. You'll need a separate, Windows Media-compatible burner application.

Pinnacle Studio 8

Pinnacle is to the consumer video market what Adobe is to the prosumer market. The company has a long history of making basic video editing accessible and effective, and the latest Studio continues this in grand style. The interface carries on Studio's standard three-zone approach, with a tabbed Album area housing video clips, transitions, titles, and such; a Preview window; and a timeline area that toggles between Storyboard, Timeline, and Text views. At the top are Capture, Edit, and Make Movie tabs.

In the Capture module, Studio 8 encodes to DV, MPEG, or a low bit-rate Preview mode and even shows a handy pie graph displaying your drive's free space and how many minutes of video the space can accommodate in each mode. Like Movie Maker 2, Pinnacle analyzes luminance levels to determine logical clip breaks in analog footage. However, Pinnacle uses its Preview Capture mode to show only a low-res version of your footage's clips. You select the clips, and Studio recaptures the segments at a higher



Studio 8
$99
Pinnacle
www.pinnaclesys.com

bit rate, thus consuming the least amount of overall drive space. If you have a 2GHz or faster PC, Studio can encode straight to MPEG format.

Editing in Studio 8 is a dream if you want to paste together quick VCD, SVCD, or DVD projects. The program features the usual ability to drag and drop elements from the album, including numerous Hollywood FX transitions. Pinnacle advertises that these effects render in real-time, but they tended to hiccup badly on an 800MHz notebook. The default titles Pinnacle includes in the album are fairly weak, but the title creation/editing tool is quite comprehensive. Most impressive is the ability to drag and drop one of 20 menus onto the timeline. The menu automatically senses how many scenes follow it and creates the corresponding number of menu items, complete with thumbnail images of each scene's first frame.

I also liked the fine-tuning tools Studio provides in a tabbed window overlay when you double-click timeline elements. The Properties tab for a video clip displays a scrubber bar with in and out points for the clip. Two preview windows show the frame corresponding to each in and out point, making it a snap to drag the points and crop your clips to the size you need. Other tabs are included for titles and overlays, frame grabbing, changing properties, and even adjusting playback speed.

Studio 8 supports videotape export, AVI and MPEG files, CD and DVD burns, and streaming files in Real Video or Windows Media formats. You can also upload a low-res version of a file for streaming from Pinnacle's Web site. You will handle most of the grunt work in setting up menus during editing, so exporting at this stage really only entails three or four clicks.

Overall, Studio does an excellent job of looking simple while concealing a surprising amount of functionality. If you want to get into DV editing with an analog camcorder, check out Pinnacle's slightly more expensive bundles that combine Studio with various hardware-capture devices.

Roxio VideoWave Movie Creator

Roxio faced a challenge with its MGI-acquired VideoWave title: How to be different from the competition without leaving users confused about what the product is and how to use it. With this edition of Movie Creator, Roxio wins on several points but still suffers by trying to vary from proven interface elements.

For example, VideoWave begins with a home page composed of five modules: Easy Capture, CineMagic, StoryBuilder,

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

VideoWave Movie Creator
$49.95
Roxio
www.roxio.com

StoryLine Editor, and Video CD/DVD Maker. Fine. We prefer when vendors condense these into three areas, but because Roxio provides mouse-over explanations for each item, the interface still works.

Selecting EasyCapture switches you to a screen with a viewing window that sits atop DV Camcorder, Capture Card, and USB Video icons. To import video from an existing video file (including Windows Media but not Real or QuickTime), you must find a little filmstrip button with a plus symbol (+) above the media library area—a search that might confuse novices. You can also perform automatic scene detection on longer files, but VideoWave makes it difficult to save these clips as separate files.

Being stuck with a storyboard view, rather than a conventional timeline, also often frustrated me. For example, creating a title starts fairly clearly. From the main editing screen, click the Text button to display a palette of 35 still- and 24 motion-based title styles. Pick a title style and click Edit to display an entry field for the title text and font, color, and title position options. The real problem comes when trying to establish when within a clip the title will display. VideoWave offers Text Start and Text End buttons to use in conjunction with a time scrubber, but VideoWave makes changing your initial selections difficult. Without a timeline, you can't span a title across multiple clips, and the general degree of control is limited.

The CineMagic module did impress me, however. The module prompts you to select an MP3 file from your collection, then choose one of five video styles: Action 1, Action 2, Nostalgia, Old Film, and Personal. Select video files totaling at least twice the duration of your MP3, and VideoWave crunches them to produce a music video that synchronizes remarkably well with your soundtrack. Overall, CineMagic nearly justifies the program's purchase price alone.

The StoryBuilder module steps you through creating a basic, template-based movie with titles, clips, and background music. It's the closest VideoWave comes to a standard editor interface. You drag library elements onto a storyline strip, and then click buttons for trimming clip duration, transitions, text titles, effects, animated overlay elements, and audio tracks. Again, VideoWave doesn't allow for a lot of control over these elements.

VideoWave renders effects before playing them, which can add editing time, but I actually preferred this to a real-time previewer that can hiccup through playback. For exporting, VideoWave supports CD and DVD burning and file output for tape or Internet-based streaming. Roxio supports Real and Windows Media formats, although I'm not sure if I like how the interface splits disc burning into the Video CD/DVD Maker module while keeping file output in the StoryLine Editor. Several background and button templates help burn discs.

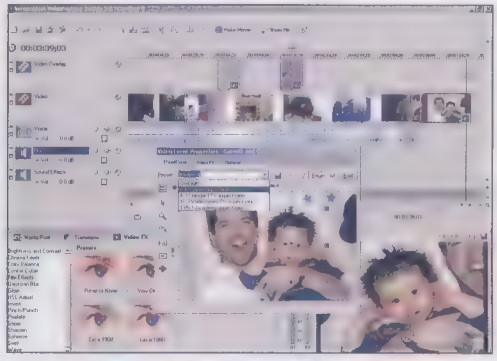
VideoWave is a decent program for newbies but leaves little room to grow. You've been warned.

Sony Screenblast VideoFactory 2.0

With Screenblast VideoFactory 2.0 looks and sometimes feels like a high-end editor while staying accessible enough for beginners. The app is actually a conjunction of Sony Digital Pictures Entertainment with Sonic Foundry's Movie Factory and Acid titles. The results could not be better.

SVF presents a timeline interface with two video and three audio tracks. Below this are the media library, an audio UV meter, and a preview window. The program defaults to displaying a helpful Show Me window with tips and tutorials.

SVF makes tasks easy, such as when creating cross-fades between video clips. On a decent timeline editor, you normally drag one clip to line A, a second to line B, and then plant a transition on a third track between them. With SVF, you drag the second clip up against the first and drag its left edge over the first clip's right edge, making an X where they overlap. This X represents your cross-fading transition, and how far you drag the overlap determines the fade's length.



Screenblast VideoFactory 2.0
$69
Sony
www.screenblast.com

But easy doesn't mean dumb. SVF truly shines with the seemingly bottomless customizability of its transitions, overlays, effects. For example, one text element is the word "Hot" in red

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

letters on a transparent background. Drag this on the overlay track, and an FX symbol appears in the item's lower right corner. Clicking it will display the overlay's properties (a window with eight tabs controlling various tasks). The "Hot" element is in fact a template you can reshape into something entirely different. Overall, the level of detail is amazing.

Sony throws in 115 filters, 170 transitions, and 16MB of free Web space to upload your movies for viewing. There's also a chroma keyer plugin for rendering certain colors transparent so that underlying media can show through.

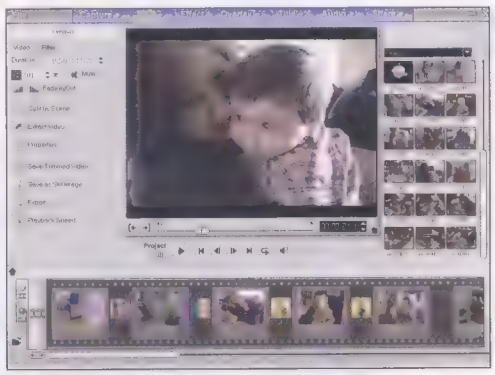
You pay a price for SVF's low retail tag, however. Chief among the omissions is an MPEG license. Unless you have something such as XP MPEG Xpack or an MPEG decoder, you can't save into MPEG or even load MPEG files into your media library. You can export to file, tape, or VCD, but there are no DVD burning tools. There's also no automovie functionality or ability to detect scene clips within analog footage, meaning you're stuck using SVF's manual splitting tool. Potentially more frustrating is the program's slow engine, which often makes previewing your movie a painful experience.

I can't give SVF a whole-hearted thumbs-up, but some of its features are incredible. Sony left many of these gaps in to hit a $69 price point, but I'd rather see an additional $99 version that plugs most of these holes.

Ulead MediaStudio Pro 7.0

The new MediaStudio Pro 7.0 is an amazing rival to Premiere, and in fact beats Adobe on several fronts. MSP7's expansive, impressive amount of features are too many to list, but I'll start with how Ulead breaks MSP7 into five discrete components. The first, Video Capture, can scan your DV tape and create thumbnails of each scene. You select the scenes you want batch-encoded, and MediaStudio converts them into DV, MPEG, or WMV formats. Ulead shines, though, in its pre-encoding color calibration and other tools for ensuring the best possible results. Video Capture can also import and encode analog footage, but there's no provision for automatically detecting scene breaks and generating clips.

MSP7's innovative take on buffer underrun protection is also slick. When the encoding system senses frames are about to drop, camcorder playback halts until system resources become available to ensure optimal encoding. If you have an older system, this feature alone may sway you toward MSP7.



MediaStudio Pro 7.0
$495
Ulead
www.ulead.com

In the Video Editor module, MSP7 follows the conventional "A/B roll" format, which means that the main interface is a timeline featuring two video lines with a transitions line between them. (There are additional video tracks for elements, such as effects and titles.) There are multiple audio tracks you can set nodes for to control volume throughout the clip. By default, the interface features a preview window for viewing the movie in progress, plus a source window for working with individual clips. Ulead advertises "real-time software playback" via its Instant Play feature, a process that depends on only rendering clips that require rendering and in fact, it does deliver nearly flawless playback.

Conversely, MSP7's Auto Slideshow feature seems a bit silly. Essentially, you capture still frames from video clips, drop them to the timeline, add a soundtrack, and press F5 with the music's beat each time you want to transition between stills. MSP7's audio/video transitions and effects are outstanding, however, including everything from moving 3D paths to minutely customizable reverb and flange. The audio effects also show up in MSP7's third component, an audio waveform editor.

Ulead tosses in a CG Infinity module, which includes 200 styles and motion paths. The module's beauty is being able to use CG's drawing tools to create your own vector-based objects from scratch and manipulate them however you please. Better still, Ulead offers the same precision in its fifth Video Paint module, a rotoscoping tool. It's nowhere as robust as Photoshop, but Ulead does include some stellar features, such as stroke macros, onionskin (seeing a dimmed version of the previous frame while painting on the current one), and frame flicking (applying a nonrendered preview of your painting on several frames to help save time).

MSP7 includes tools for VCD, SVCD, and DVD creation, plus 16:9 widescreen support, compatibility with Sony's recent MicrosMV format, the ability to import Flash files, and more. I won't quite concede that MSP7 is more capable or feature-rich than Premiere, but when you look at functionality vs. price, Ulead emerges as the clear winner.

by William Van Winkle

(To read our reviews of DVD utilities to use with your video editor, subscribers can go to www.cpumag.com/cpumay03/dvdtools.)

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

MADE WITH NO
LIMITS IN MIND

ALL-IN-WONDER® 9700 PRO

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ATI.COM

by Chris Pirillo

Linux For The Rest Of Us

Yeah, I experimented with a few semi-random distributions of Linux; color me curious. But at the end of the day, I found myself floating back to Windows XP. It has everything I want in an OS, and everything I need to get through my day. Even the allure of a "free" platform isn't enough to pull me away. I love optimizing the personal computing experience as much as the next geek, but there's only so much control I truly want.

When I want to play with a penguin, I'll throw Knoppix into my system and be more than satisfied. Check this out: a fully functional Debian-based kernel that comes with more than 2,000 programs and games (including an office suite). Oh, did I mention that it doesn't touch your hard drive? Download the ISO, burn a CD, set it in a bootable drive, and you are set. No installation headaches. No driver contentions. If you like it, you should be well on your way to adopting some permanent variation of Tux. Personally? I'm nowhere beyond the n00b zone—and neither is 99% of the planet. Why go Linux? It's affordable on affordable hardware. But mark my words: There will come a day when every operating system will be given away to the consumer. How? Follow the bouncy ball.

Lindows: Linux for the unsophisticated masses.

Lindows: Linux for the unsophisticated masses. Why should Microsoft own everything on the desktop? Without true competition, we're subject to complacency and industry stagnation. Apple's plugging away at a very impressive OS X, but even its own flock is having difficulties adjusting to an Aqua-splashed future. The desktop war has just begun, and Michael Robertson is leading the charge. Not to say that other visionaries have been shortsighted, but I can think of nobody else who cares to deliver a friendlier Linux-based OS to my parents.

Looking at and judging LindowsOS where it stands today is a mistake of epic proportions. Think ahead. Remember Mozilla when it first hit the Web? It was a joke—with a really bad punch line. Sitting in front of version 1.3, anybody can plainly see that it's the most powerful browser for every operating system—with a great price tag. It just goes to show you what can happen when a dedicated handful of individuals put their heads together to breathe life into an idea. That's the beauty of Linux, and that's the heart of Lindows.

I was invited to speak at the Desktop Linux Summit a couple of months ago. In accepting this responsibility, I inadvertently found myself smack-dab in the middle of a controversy. Plans had been made, promises had been broken, and feelings had definitely been stepped on. Since I'm just a geek who loves gadgets and gizmos, I decided to approach the event with open eyes. I had nothing to gain but knowledge, and an education is exactly what I received. Surrounded by command-line junkies and early adopters, I found myself immersed in an environment conducive for questioning the status quo.

Through the Click-N-Run Warehouse, Lindows subscribers can install software packages and system updates without thinking. Customized "aisles" can be shared with other members and easily accessed after OS reinstallations. If paying for this type of service sounds farfetched, take a hard look at MSN and .Mac. We're gonna get nickel-and-dimed to death. The only question is: Which company will you want to control your life? Apple, Microsoft, Lindows? Many power users will lament this change. They'll click and scream all the way. It's coming, regardless. It's all about the bottom line—yours, theirs, and ours.

Adding and subtracting new features to and from our desktops should be no more than a one- or two-click process. And for weathered keyboard jockeys, it already is. That's not the market Lindows is going after. Instead, it's targeting folks who don't know a USB hub from a KVM switch. In other words, they're trying to bring choice back to the PC market. And no, it's not already there. When was the last time you walked into an electronics superstore and overheard an elderly couple ask for something other than "Mac or Windows" or the clerk volunteering any other alternative? One day, if Mr. Robertson has his way, they might. ■

You can dialogue with Chris at chris@cpumag.com.

Chris Pirillo is currently the No. 1 "Chris" out of 19 million Web pages indexed through Google.com. If he's not working on Lockergnome.com, Gnometomes.com, Gnomedex.com, or Gnomies.com, he's writing poetry for his wife. Here's his latest: "Fingernails are brutal when they're pressed against the skin. With the dermal layer punctured, silver blood is found within. Through a sunbeam, crystal trickles from the crack atop your chin—and so there it must revolve until the lip can find its twin where it's focused through the lens of something other than your sin." He has no plans for quitting his day job in the custodial arts.

by Pete Loshin

Thinking Outside The Box

Pete Loshin, former technical editor of software reviews for Byte Magazine (print version), consults and writes about computing and the Internet. He also runs www.linuxcookbook.com. He owns shares of both Microsoft and Red Hat and believes that Windows isn't for everyone, but neither is Linux.

Times are tough these days, but if you think open source is for chumps, think again. You won't make billions Bill Gates-style with your SuSE or Red Hat discs, but you could make a nice living with the right attitude and a little skill.

First, many Linux distros, and most other open-source software, are freely distributable, so there's often nothing to stop you from burning copies and selling them (for a reasonable price) at a flea market (check the fine print, as "I am not a lawyer" applies here; commercial Linux vendors sometimes include nonfree software). Add value by writing a user guide or offering installation or help services, and you have got yourself a minibusiness.

Another tried-and-true road to wealth is the service bureau, where you buy (or lease) expensive equipment (think mainframes or high-end color printers or drum scanners), and find customers who'll pay to use it. Many open-source projects offer even better opportunities to clever techies who can timeshare their knowledge by using free code to provide services.

For instance, commercial enterprise-network and system-management software costs a lot and still requires expertise to master. Linux hackers who know their way around a command line and shell scripting can support companies needing various system- and network-management services.

Consider event-log management and response services. An "event" in system-speak occurs anytime a system message is generated. On big networks, you need to log and track events as they happen and respond to the important ones fast. Companies spend big bux on commercial event-logging software that's too complicated to use; they could outsource the task to clever Linux entrepreneurs who master Linux Event Logging for Enterprise-Class Systems (evlog; evlog.sourceforge.net). You can custom build a user-friendly interface to evlog for your clients or just install it and manage it remotely for them.

Configuration management is another nightmare for large *NIX networks, but the GNU configuration engine (cfengine; www.gnu.org/software/cfengine) provides a meta language sysadmins can use to define how a network's systems should be configured.

With cfengine, you specify classes of systems (for example, systems running Linux or systems in the payroll department) and then define attributes those systems should have. Each system sorts itself into the appropriate cfengine class(es), and cfengine makes only the necessary changes. Master cfengine and you can manage your own server farm or offer your services to companies with more systems than staff.

Artists, photographers, and printers are well served by free software, such as GIMP (GNU Image Manipulation Program; www.gimp.org), for image editing and retouching. Printer and scanner support for high-quality input/output under Linux keeps getting better; chances are you can plug and play.

You can custom build a user-friendly interface to evlog for your clients or just install it and manage it remotely for them.

Say you have a high-end but underused printer and/or scanner. The Common UNIX Printing System (CUPS; www.cups.org) simplifies getting great output from almost any printer. Add free scanner software, such as Kooka (www.kde.org/apps/kooka) for an instant quality photo service bureau. Use GIMP, and you can offer retouching and restoration services.

Universal scanner access is made possible by SANE (Scanner Access Now Easy; www.mostang.com/sane), an API more than a dozen front-end programs use. One, XSane (www.xsane.org), works as a GIMP plug-in to let you capture images directly.

Writers, printers, and publishers also get free professional-quality software. Want to publish a book? Try the heavy-duty typesetting environment TeX (www.tug.org) and TeX macro package, LaTeX (www.latex-project.org), plus friendlier GUI tools, such as LaTeX front-end Kile (perso.club-internet.fr/pascal.brachet), LaTeX word processor LyX (www.lyx.org), and GUI front-end TkTeX, offering easy access to TeX tools (www.cs.indiana.edu/~ndanner/tktex.html). TeX-related programs lean heavily toward *NIX systems, but Windows and Mac implementations are also available. I didn't have to go looking for this stuff, either; these are just some of the apps included with SuSE 8.1 Professional. Professional, indeed. ■

Get saucy with Pete at pete@cpumag.com.

FRINGE

by Michael Sweet

Words From The Web

YEAH, THEY *ACTUALLY* SAID THIS . . .

From a forum for Bill Maher's new HBO show "Real Time":

Consider yourselves lucky—you actually get to watch it. I'm in Canada and we don't have HBO.

Hey, at least you have curling, eh?

From an AOL chat room:

Go milk some cows!

The insults in chat have become so brutal.

From a Lycos 30s chat room:

Sometimes I wear grapefruit under my shirt. Is that so wrong?

Yes, yes it is.

From a Yahoo! chat room:

Anyone wanna trade an Xbox & one game for a GameCube?

*Oh, what a **great** offer!*

To Rule Is Cool

Think you can run a nation better than the French? Yeah, me too. And now you can prove it by playing Jennifer Government: NationStates (www.nationstates.net), an online simulation based on Max Barry's novel of the same name.

NationStates is simple in design and execution, recalling the text-based games that were so popular once upon a time. I like several things about the game. Cool feature number one: It's completely free. Cool feature number two: the long list of interesting titles you can choose for your country, such as Federation, Dominion, and Free Republic. My country shall forever be known as the Grand Duchy of Meatsaxony. Cool feature number three: You get to determine the political ideology of your country based on how you answer a few questions in a short questionnaire.

Depending upon how you answer, your country will be placed in one of several U.N. categories, such as a Capitalist Paradise, a Psychotic Dictatorship, a Corporate Police State, or another of several possibilities. Your country's dossier will list the degree of civil rights your people enjoy, the status of your nation's economy, and the degree of political freedoms your people can exercise. You'll occasionally be presented with an issue that the people are clamoring about, such as whether to improve the nation's educational system or provide more money to the military and police.

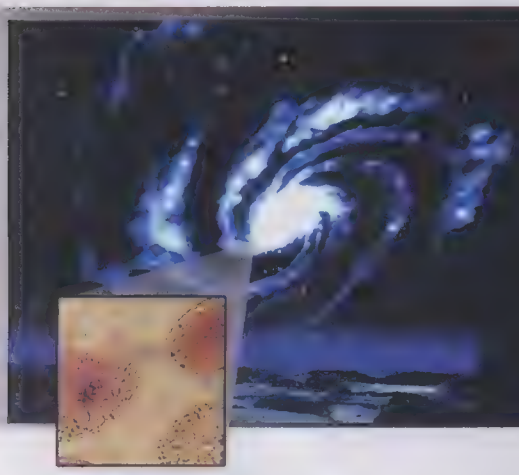
One of the critical decisions for your fledgling state will be whether to join the United Nations. Doing so may open doors for your country, but you'll also have to abide by the UN's rules, which may limit the way you wield that enormous political power you love so much. But with your considerable diplomatic skills, why should you worry?

If you find a strange, interesting, or funny Web site in the course of your Internet travels that you think is worthy of Fringe, send your suggestion to fringe@cpumag.com

Grading Gadgets

Do you get suckered into buying the latest worthless crap you see on those late-night TV commercials? Next time, do some research before you buy. You won't find a review of the InstaPasta Pot in *CPU*, but you will find it at the Does It Work? Web site.

www.krbctv.com/diw



Put Everything In Perspective

The Powers Of Ten Web page contains a graphical online applet that begins from a point outside the Milky Way and zooms in to an earthbound quark (or, in geek terminology, from 10 million light years away to 100 attometers). It's far out, and far in.

micro.magnet.fsu.edu/primer/java/scienceopticsu/powersof10

Four Score & Seven Slides Ago

Abe Lincoln may have been a smooth politician, but his presentation skills were, um, lacking.

WWW.NORVIG.COM/GETTYSBURG/INDEX.HTM

Speed Surfing

Got broadband? Find out exactly how fast your connection is. Then call your broadband provider and tell them to kick it up a notch.

PROMOS.MCAFEE.COM/SPEEDOMETER/TEST_3000.ASP

Infinite Loop

Can You Speak Up? I Just Had A Fender Bender

Cell phones weren't the first technological marvels to draw the ire of auto safety advocates worried about driver distractions. Can you pick out distraction scapegoats of yore?

A. Windshield wipers
B. Fast food drive-through windows
C. Bikini-clad girls waving signs for free car washes
D. Radios
E. High-intensity discharge headlights
F. Nine Inch Nails
G. Palm Pilots

If you guessed A, D, and E, you're right, and your insurance premiums are probably much lower than ours.

Sources: CNN; Knight Ridder Newspapers

Musicmatch MX

Internet Radio Meets Its Match

The lingering, unwritten law left over from the dot-com heyday says "Net users will not pay for content." And sure enough, when Yahoo! wanted cash to forward Web mail, we passed. When RealNetworks wanted cash to view additional news and sporting video snippets, we passed. When the free online file storage sites blew away, leaving 500MB/$30 per month accounts, we said, "Um, hey, this CD-RW costs a buck. Pass."

Then there was Musicmatch and its Radio MX service. Like a host of other sites, Musicmatch served up 24/7 streams of genre-specific music but then went one step further. For $4.95 per month, you could specify the artists you enjoyed, and MX would create radio stations based around your preferences. Better still, for those with broadband connections, Musicmatch's "Plus" service streamed at a glorious, CD-quality 128Kbps. No more DJs. No more ads. No more being trapped with a handful of music stations, most of which bite.

Did we pass on Radio MX? No way.

Of course, Radio MX had its share of problems. The entire field of online radio has faced five years of relative misery, and it's not out of the woods yet. The sweet streaming radio services of early 2001, such as Echo, NetRadio, and SonicNet, have evaporated. The recording industry pressured the U.S. Copyright Office to enforce royalties on every song streamed to a user, which in turn knocked most terrestrial radio simulcasters and a host of Web-only broadcasters clean off the Internet.

Yet Musicmatch has endured and, believe it or not, even turned a profit. The company faces intense pressure from heavyweights such as Microsoft and RealNetworks, but it remains a favorite with millions of users. So whether you're a Musicmatch devotee or brand new to the company's applications, tune in here for our Musicmatch spotlight.

Humble Roots

Chalk up one more mark in the column for "professors who didn't get it." In 1984, Dennis Mudd finished his undergrad degree at U.C. Berkeley and landed a spot at Eastman Kodak. This was before digital cameras and the Internet, but not so early that Mudd didn't learn a valuable lesson: Magnetic media is cheap, high-capacity, and getting cheaper and higher-capacity all the time.

By 1986, Mudd was ready to jump ship for the Wharton School of Business. A course on IT inspired his master's thesis on

Do You Match The musicmatch® Profile?

Good businesses need to understand their customers, and Musicmatch is no exception. The company regularly polls its customer base and found the following statistics about its users.

Male:	65%
Age 25 to 44:	50%
Over $50,000 annual income:	60%
Attended college:	90%
Live in the United States:	55%
Average CDs purchased per year:	More than 21
Average CD collection:	More than 250 discs
Most popular genres:	Top 40, Classic Rock, Alternative, '80s, and Classical

distributing digital music over coaxial cable networks for subsequent saving on tape in people's homes. Mudd was a hard-core party tape mixer with a space-swallowing collection of LPs and CDs. He laid out a plan for a company to deliver these services called National Digital Audio Distribution. The prof gave him a B, Mudd took his MBA to Hewlett-Packard, and he sat on the concept for 10 years.

In 1997, Mudd was still convinced that the future of online music was in downloads, and both his wife, Pamela, and HP friend and colleague Jim Smith believed him. Mudd realized that a radical change in consumers' music handling habits could only end in failure. A new distribution system would have to begin by encompassing the music usage model consumers already found comfortable. The result was the first version of Musicmatch Jukebox.

Up Close With Musicmatch Founder & CEO Dennis Mudd

Musicmatch CEO Dennis Mudd shares his thoughts about the future of digital music.

CPU: You've had this digital music vision for a long time. Where does it come from?

Mudd: I've always been a music fan and have always been frustrated [with] how difficult it is to choose the music you want to listen to. So I wanted to be able to do two things: I wanted to be able to get access to tracks individually, but also not have to go to stores and buy them individually. I just wanted to be able to download them and put them onto mixes.

CPU: 2003 looks to be a big shake-up year for digital music and radio. What's happening?

Mudd: Probably the biggest thing is Universal's changed. Universal Records has become much more aggressive about offering download licenses that can really be turned into a viable music service. There's reasonable DRM [digital rights management], the ability to make an unlimited number of burns, burn an unlimited number of copies, send to portable devices an unlimited number of times, and so on. Those are really the things necessary to sell even major label content.

CPU: The labels must be nervous. Hasn't the common wisdom been that if you resume fair use, then you're still going to face everybody swapping your content?

Mudd: I think that everybody's nervous about big changes like this, so this is a major shift in the industry. But I'd say that Universal, probably as much or more than anybody else, is really leading the industry, trying to figure out how they're going to stop this significant decline of music sales and start making the industry larger again. They know they have to start taking risks.

CPU: Are we at the point where there's nothing to lose?

Mudd: Well, you could say that. When does the pain of making these changes and taking these risks become less than the pain of staying on the same course? I think it's about right now.

CPU: Did you always expect that licensing would be this tough of a battle?

Mudd: No. Back in 1997, I had a good meeting with a couple of the different labels, and it seemed like we would be able to do licenses. I was still working for Hewlett-Packard at the time, back in the early days of seeing if this concept would be viable. I went down with a few of the labels, got some positive responses, and that was good enough for me. I quit my job, really started working on obtaining licenses, and here we are six years later—still no licenses. It was kind of a rude awakening on how difficult the licensing environment really is.

CPU: When I listened to Musicmatch MX at 128Kbps a year ago, there was a lot of skipping and hiccups I don't hear anymore.

Mudd: It's actually 64Kbps MP3pro now, which is equivalent to an old 128Kbps bitrate. 128Kbps MP3 is the right quality, but it's too much data to reliably push down the Internet, given all the different problems that can occur between our servers and the end user. So we went to 64Kbps MP3pro, and it made a huge difference: same quality but much, much more reliable.

CPU: What's next for Musicmatch?

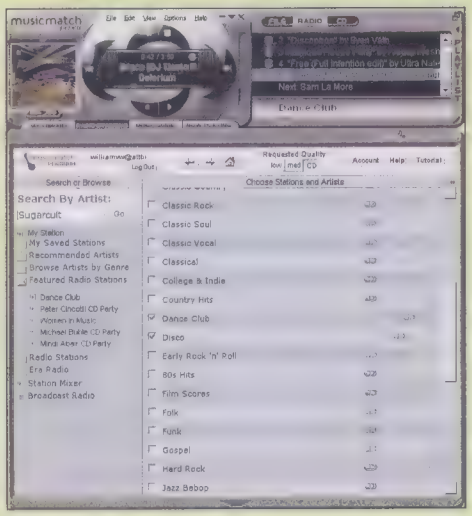
Mudd: In the future, you will see track-on-demand

streaming, so you can actually choose the specific tracks you want to listen to. The additional thing is that we will offer on-demand downloads. We're holding off a little while longer while the landscape fleshes out, but I think we're very close to having licenses that can be compelling to users. It can be good enough for people to want to purchase and for us to recommend that they purchase, as well. Some people will listen to the Artist ON DEMAND playlist, discover this artist they love, then discover some tracks they love. We want them to be able to right-click and download the tracks. So it's an impulse buy, not something where somebody wakes up in the morning and says, "You know, I feel like going to buy some dollar downloads." That's a hard business model to make work. ▲

Musicmatch MX's Artist ON DEMAND service lets users specify which artist's music they want to hear.

would have to wait until a 1998 agreement with Xing to license the company's MP3 technology.) The company gathered feedback from its small base of customers while Mudd and crew stressed out, lost sleep, and saw their dreams ending before they'd hardly begun. With one foot in the grave, Musicmatch was down to its last $8,000. Then version 2.0 arrived.

In a situation that must have been akin to watching election results roll in, Mudd recalls how two sales arrived on the first day. The second day brought four. Then 18. Then 50. The company was saved. Today, Musicmatch boasts 31 million registered users. Jupiter Media Metrix numbers show that 8.7 million people in the United States open the Jukebox application each month. Worldwide, the number hits 15 million, which officially knocks Winamp off its throne and leaves Musicmatch Jukebox the most-used music-centric player app in the world.



Users can choose from a broad selection of music genres and featured radio stations with the Musicmatch Station Mixer.

At the time, Jukebox was alone in the market. Xing would follow with its jukebox in another year, and RealJukebox chimed in a year after that. But in February of 1997, Musicmatch had the world to itself . . . and bombed. The situation was grim. Mudd had not only tapped out the life savings of all three founders to get Musicmatch off the ground, but he'd also leaned heavily on friends, family, in-laws, and anyone else he could find, scraping together about $400,000. In the first four months, roughly 20 copies of Jukebox sold. As Mudd himself states: "It was a disaster."

Version 1.0 suffered from many problems, not the least of which were a difficult interface and a foundation built on RealAudio rather than MP3. (The switch

Remaking Radio

When Musicmatch 6.0 Beta debuted in October of 2000, it sported a new feature called MP3 radio. This early radio service depended upon the company's millions of users opting in to Musicmatch's personalization service, which let Musicmatch track which songs the user played. Soon, it was apparent that people who listened to Britney Spears also listened to Janet Jackson and that Metallica maniacs often loved their Ozzy. (This may seem obvious to many of us, but remember that the object was to quantify these associations in Musicmatch's database.) With this data, the new radio service could ask the user to name a handful of music acts and leverage its database of known "similar" bands to create a unique radio station personalized for that user. This arrangement lives on today in Musicmatch's Artist MATCH radio offering.

By the following May, the radio service had racked up over 750,000 listeners, and it was time to turn the offering into a revenue machine. The 128Kbps-capable Radio MX subscription service arrived with Musicmatch 6.1 Basic or Plus for $4.95 per month. At this time, the company still expected that the recording industry was on the verge of embracing the online era. "Music fans will have the ability to select favorite tracks as they hear them on their personalized radio stations and instantly add them into their music library along with their ripped or downloaded music," read one Musicmatch statement at the time. Given that MP3.com's similar MyMP3 "online music locker" concept had been crushed by the RIAA one year before, Musicmatch's optimism was a little unfounded. The closest Musicmatch has come to this vision is letting users add radio tracks to an Amazon.com-like wish list.

Legal trouble. In fact, it was now Musicmatch's turn to face the legal music. On June 8, 2001, the RIAA smacked Musicmatch with a lawsuit saying that Radio MX violated the DMCA (Digital Millennium Copyright Act). Users were able to define their listening experience too clearly, said the suit, and so the service violated copyright law. The suit demanded that Musicmatch be shut down, and damages awarded of up to $150,000 per work infringed, plus attorneys' fees. However, barely one month later, the two parties reached an agreement, the details of which are not publicly available. In essence, Musicmatch secured a separate peace with the RIAA while the rest of the online radio industry waited for the Copyright Office to establish its highly controversial flat-rate Webcasting royalties policy.

In a nutshell, the Librarian of Congress, who rules on broadcast royalty matters, took the advice of Broadcast.com founder Mark Cuban to establish a flat rate for Webcast royalties rather than a percentage of revenue royalty. This would effectively shut out competition from small Webcasters, which can expect to pay tens or even hundreds of thousands of dollars in royalty payments to the RIAA. For Webcasters to recoup this cost, plentiful advertising becomes necessary,

which in turn drives away listeners. See www.copyright.gov/carp/webcasting_rates_final.html for the specific numbers.

New name, new features. With the legal coast cleared, Radio MX roared on to dominate the field. By February of 2002, over 100,000 people were paying for MX, and the radio service as a whole was finally profitable. In November, Mudd and company closed critical deals with four of the five major labels: BMG, EMI Recorded Music, Universal Music Group, and Warner Music Group, leaving Sony as the single holdout. These new deals gave Musicmatch nonexclusive licenses to broadcast the labels' digital catalogs as part of a new service that would soon become known as Artist ON DEMAND.

With the introduction of Artist ON DEMAND in December, Radio MX became Musicmatch MX, which encompasses a suite of music services. The Musicmatch MX Gold service is essentially what Radio MX used to be. It includes Artist MATCH, genre and featured radio stations, and more, all streamed in a CD-quality bitrate for $2.95 per month (billed annually). MX Platinum covers everything in MX Gold, costs $4.95 per month, and includes Artist ON DEMAND.

Artist ON DEMAND rides the edge of the copyright law. You can't dictate which songs by a certain artist are played, nor can you set a certain play order. But you can elect to play only songs by one artist. In reality, Musicmatch is legally bound to play a track by some related artist every so often, but you can just fast forward past these if you don't like the song. For example, we went through seven Aerosmith songs (out of 66) before hitting one by Jon Bon Jovi. Additionally, Musicmatch only has partial catalogs for most major artists. For example, the service only has 57 songs by Led Zeppelin but 129 by Snoop Dogg. Despite the restrictions, though, Artist ON DEMAND now sports more than 200,000 tunes spread across 8,000 artists while the entire Musicmatch MX service boasts well over 300,000 songs.

In one sense, AOD is barely even still radio. It may be the future of radio, where users have better control over what they hear. Services such as DMX and satellite radio offer the benefits of subscription but only down to the level of selecting genre. We may never get to set our own playlists without owning or licensing the music, but the ability to pick artists while still discovering new artists within our tastes is a substantial improvement. If the technology ever rolls along that lets us stream high-bandwidth content from the home to the car, maybe we'll be able to ditch conventional car radio decks altogether.

DJs, you better keep those resumes fresh.

by William Van Winkle

For more, subscribers can go to www.cpumag.com/cpumay03/musicmatch

Other Major Radio Players

Yahoo! LAUNCHcast plus (launch.yahoo.com)

LAUNCHcast plus is a close cousin to Musicmatch MX, although with only 85,000 songs (150,000 via the fan stations) in its present database. LAUNCH lacks "artist-on-demand" functionality but instead does something similar to Artist MATCH. In fact, LAUNCH goes one step further, letting users influence their personalized station playlists by rating songs, artists, and albums. Although LAUNCHcast is free and subsidized by ads, LAUNCHcast plus is ad-free and costs $3.99 per month or $35.99 per year.

Radio Free Virgin (www.radiofreevirgin.com)

Radio Free Virgin proves that a few novel features and a sense of humor can go a long way. Would you be excited if we told you that RFV's client could record streamed tracks? Well, forget it. That feature came and went in barely a blink back in 2001. But you do get a five-band equalizer, a fly-out buddy list with emoticon-enabled IM/chat, "authorized" top-name artist radio stations, a song history and bookmark list, plus DSP enhancements for making your stream sound wide or even wider. For $4.95 per month, you get Radio Free Virgin Royal, with over 50 ad-free channels delivered in CD-quality streams. Whether this is enough feature value to pry open your wallet, any application setup that offers to plant a shortcut on your Desktop, toolbar, and/or "the surface of the Moon" is OK in our book.

RealOne RadioPass (www.realone.com)

If only to stay current with the latest Real formats, you probably have the RealOne client already installed on your system. If so, you have access to over 3,200 radio station simulcasts from around the world for free. Pick up the RadioPass account for $5.95 per month and you get over 50 stations of CD-quality, ad-free, pre-programmed music. A scrolling "ticker" keeps you informed as to what is playing on your premium stations at any given time. If you're already a SuperPass subscriber, RadioPass is only an extra $3 per month. Compared to the other services, RadioPass runs a bit on the spendy side. However, if you're a video content fan, RealOne is the client of choice, and it may be worth your while to keep all of your multimedia managed through one client.

Radio@Netscape Plus (radio.netscape.com)

In case you wondered what happened to Spinner, meet its successor: Radio@Netscape Plus. Much like the Spinner of old, Radio@Netscape Plus offers 175 radio stations across both the popular and the obscure. Some channels feature "celebrity DJs," such as Britney Spears and P. Diddy, although we have a difficult time imagining these types working at their PCs, ripping tracks into RealAudio format, and FTPing them to Netscape's servers, but what do we know? Radio@Netscape Plus also features 16 EQ presets and a 10-band equalizer. Select a station, and the program suggests three related stations plus what songs are about to play on them. This is a great alternative to loading a new station before you can find out what's playing. Although not on par with the subscription services, Radio@Netscape Plus is a great free radio service.

Coder's Corner: XML

XSLT Part V: Parameters, Variables & Conditional Branching

In Coder's Corner: XML, Ian Graham shows you how to program with XML. Ian is the author of such books as "The HTML Sourcebook" and "The XML Specification Guide."

Last month, we looked at XSLT's <xsl:for-each> and <xsl:sort> elements, which give a style sheet control over how items will sort when XSLT loops over and processes a list of nodes. We used an XML document containing <item> elements to illustrate this. We used <xsl:sort> to sort the <item>s alphabetically by <name> and numerically by birth year (<birthday>). We also used XSLT/XPath string-manipulation functions to remove unwanted white space from string values and extract specific substrings from inside a string.

The sort mechanism reorders the set of selected nodes being looped over. Functionally, this is equivalent to reordering the <item> elements in the XML input data to match the sort condition. Often, however, a transformation needs more sophisticated internal processing to count nodes, remove specific nodes from processing, or calculate output data that's based on previous processing steps. This is true when you're choosing when to include/exclude certain input data from output or when controlling output based on the output sequence.

Such processing requires programming features, such as parameters (to store and pass quantities between templates), Boolean operators, and a conditional branching function (if/then/else). XSLT supports parameters, variables, and branching functions via the elements:

<xsl:if>
<xsl:choose>, <xsl:when> and <xsl:otherwise>
<xsl:variable>
<xsl:param> (and <xsl:with-param>)

XPath supports Boolean functions/operators, used as "test" conditions/attributes in <xsl:if> and <xsl:when> elements. XSLT isn't a procedural language, though, so using these control components may seem counterintuitive to some.

Alternate Row Shading & Data Elimination

Our goal is to modify last month's style sheet by eliminating from the output physicists born prior to 1900 and changing the output formatting so the HTML table rows alternate gray and white backgrounds. We'll look at these independently for now. The relevant parts of last month's style sheet are:

```
<xsl:template match="/">
  .....
  <table border="1">
 <tr><th> Name </th> <th> Birthday </th> <th>
Birthplace </th> </tr>
  <xsl:for-each select="/data/item" >
   <xsl:sort select="normalize-space(name)" />
   <xsl:apply-templates select="." />
  </xsl:for-each>
 .......
</xsl:template>

<xsl:template match="/data/item" >
 <tr bgcolor="{favoriteColor}" >
 <td> <xsl:value-of select="name" /> </td>
 <td> <xsl:value-of select="birthday" /> </td>
  <td> <xsl:value-of select="birthPlace" /> </td>
  </tr> </xsl:template>
</xsl:stylesheet>
```

The first template loops over the item elements (sorted alphabetically by name) and recursively calls the second template to create table rows for each

<item>. In the second template, each HTML table row's color is set equal to the <favoriteColor> element's value.

Remove Older Physicists From The List

It's easiest to eliminate physicists born before 1900 from the HTML output by skipping the row-generating template. The <xsl:if> element is one method; the changes (in bold italics) to the main template are:

```
<xsl:for-each select="/data/item" >
  <xsl:sort select="normalize-
space(name)" />
  <xsl:if test=" ">
    <xsl:apply-templates select="." />
  </xsl:if>
</xsl:for-each>
```

If the condition inside the test attribute is true, the rules inside <xsl:if> are processed (a row is created). If false, the rules are skipped. For our design, we need a Boolean test, such as test="birthyear >= 1900". We want the test to check if the birth year is greater than or equal to 1900. If so, the row-generating template is called. If not, the item is skipped. The needed expression is: test="substring (normalize-space(birthday),string-length(normalize-space(birthday))-3,4) >= 1900"

The substring(normalize-space(birthday),string-length(normalize-space(birthday))-3,4) extracts the four-digit year from the birthday element values. The rest is the Boolean test. The expression >= 1900 tests if the value is greater than or equal to 1900. The set of Boolean operators XPath defines include or, and, =, != (not equal), <=, <, >=, and >. However, inside an XML document, the > and < characters change; > becomes > and < becomes <

Alternate Gray & White Rows

We'll now change the row-generating template to alternate the background colors. The style sheet is:

```
<xsl:template match="/">
  .....
  <table border="1">
  <tr><th> Name </th> <th> Birthday
</th> <th> Birthplace </th> </tr>
  <xsl:for-each select="/data/item" >
    <xsl:sort select="normalize-
space(name)" />
    <xsl:apply-templates select="." />
  </xsl:for-each>
  .....
</xsl:template>
```

When the row-generation template is called, it doesn't know if this is an even or odd row (assuming even rows are one color and odd another). We first modify the main template to pass needed information to the row template by changing the <xsl:apply templates> element to read:

```
<xsl:apply-templates select="." >
  <xsl:with-param
name="rowCount" select="position()" />
</xsl:apply-templates>
```

The element will now have an <xsl:with-param> element defining a parameter ("rowCount") that will pass to the called template. rowCount's value is the value of the position() XPath function, which returns the numeric position (1, 2, 3, etc.) of the node (from the <xsl:for-each> loop) this template will apply to. The row-generating template must be able to receive this parameter and generate the rows. One possible version is (changes in bold italics):

```
<xsl:template match="/data/item" >
  <xsl:param name="rowCount" />
  <xsl:variable name="rowBgColor" >
    <xsl:choose>
    <xsl:when test="$rowCount mod 2
= 0">
      <xsl:text>white</xsl:text>
    </xsl:when>
    <xsl:when test="$rowCount mod 2
= 1" >
      <xsl:text>#333333</xsl:text>
    </xsl:when>
    <xsl:otherwise>
<xsl:text></xsl:text></xsl:otherwise>
  </xsl:choose>
  </xsl:variable>
  <tr bgcolor="{$rowBgColor}" >
    <td> <xsl:value-of select="name" />
</td>
    <td> <xsl:value-of select="birthday"
/> </td>
    <td> <xsl:value-of
select="birthPlace"/> </td>
  </tr> </xsl:template>
</xsl:stylesheet>
```

The <xsl:param> element declares a parameter named "rowCount" and lets the template receive this data when the template is called. Inside the template, the parameter is referenced using the notation $rowCount.

The next change is the <xsl:variable> element, named rowBgColor. In XSLT, a variable is like a function: Its value is determined when the function (the rules inside the <xsl:variable>) is evaluated. Looking at <xsl:variable> shows the evaluation depends on the parameter passed to the template ($rowCount). The rowBgColor's value is one of two values: the strings "white" or "#333333", depending on the value of $rowCount. The <xsl:choose> contains <xsl:when> elements selecting for the two alternatives. Each <xsl:when> is selected according to the test condition. Thus, <xsl:when test="$rowCount mod 2 = 1" > .... </xsl:when> is chosen when the test condition is true. This condition uses the modulo function ($rowCount mod 2) to check for even or odd rows. $rowCount mod 2 takes the value of $rowCount, divides it by 2 until it can't any further, and returns the remainder. If it's even, the modulo is zero. If odd, the modulo is 1.

The variable's evaluated value becomes the table row background color: <tr bgcolor="{*$rowBgColor*}" >. The bgcolor attribute value is the value of the rowBgColor variable: "white" or "#333333", depending if the row is even or odd.

This design passed the position() to the row-generating template and let the row template figure output the color to select. An alternative is to determine the proper color in the main template and pass the color name to the row-generating template. You can also play with the modulo operator to have three or more alternating colors.

It's tempting to want to combine the two missions to produce an HTML list of only physicists born after 1900, alternating row colors. This requires a better understanding of XPath expressions, which we'll tackle next month. CPU

by Ian Graham

(Full examples of this article's documents are available at www.utoronto.ca/ian/articles/may03.)

Lisa Lopuck, www.lopuck.com, is a Web creative consultant helping companies define and plan their Web creative strategy, information flow, and visual look and feel. She is also the author of numerous best-selling books on Web design, including "Web Design for Dummies," and is a sought-after speaker at Web conferences and universities around the world.

by Lisa Lopuck

Finding The "Big Idea"

The mantra of the last few years in Web design has been "user-centered design." This mantra is centered on the belief that the best-designed Web sites are those that take into account a user's needs. For example, how can the Web site facilitate Task X or Task Y? In fact, in last month's column, I discussed the importance of developing user personas to guide the creative team in developing an architecture and flow that supports the needs of specific types of users for a given site.

Although user-centered design is important, it leaves one thing out: creative innovation. Focusing solely on user-centered design results in a reactionary, fix-it approach. In this approach, designers and information architects identify a user's needs and then figure out how to solve them through the site's structure and interaction design. There's more to site design, however, than solving user flows. Increasingly, designers are digging deeper for the "Big Idea," an overall theme or metaphor for the site's experience. For example, the GoArmy.com site frames the typical Army information—jobs, recruiting, etc.—in a personal, peer-to-peer tone, allowing you to *experience* seemingly mundane information and tasks through the eyes of a person just like you. That's much more interesting, and better serves the goals of the site—motivating people to enlist.

Although user-centered design is important, it leaves one thing out: creative innovation. Focusing solely on user-centered design results in a reactionary, fix-it approach. Increasingly, designers are digging deeper for the "Big Idea," an overall theme or metaphor for the site's experience.

Finding Customer Insights

So how do you arrive at the Big Idea? You simply start with a brainstorm. If you've built a set of user personas, you have a starting point for getting inside the head of your customers. What are the deeper truths, or insights, about these people's daily lives, their struggles and motivators as they relate to your site's offerings? If your site sells cellular phones, make a list of the funny things people love and hate about their phones, how they use them and perceive them. For example, do people think their phone is an extension of their image?

Finding Brand Insights

The next step is to brainstorm a list of adjectives and metaphors that convey your brand. How is your brand or offering better or different from others? If you offer cell phones that run the gamut from fun, pink fuzz and leopard-spotted phones that appeal to teens through to sophisticated VIP phones, you may be tempted to focus your site on conveying the breadth of your product line.

Your customer insights, however, revealed that people think of their phones as a reflection of their ego. Aha! Perhaps the theme of your Web site could be "Make a Personal Statement." The site could focus on people and their lifestyles rather than the wide array of products you have. By combining customer and brand insights together, you can arrive at the Big Idea that can serve as the visual theme, the editorial tone, and even the organizing principle of your Web site. Suddenly, you are delivering information and accommodating user flows through tasks in a more compelling experience. ■

You can contact Lisa at lopuck@cpumag.com and see her work at www.lopuck.com.

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by Rob "Cmdr Taco" Malda

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Rob "CmdrTaco" Malda is the creator and director of the popular News for Nerds Web site Slashdot.org. He spends his time fiddling with electronic gizmos, wandering the 'Net, watching anime, and trying to think of clever lies to put in his bio so that he seems cooler than he actually is.

It doesn't seem like all that long ago that I would look forward to reading the comics in the newspaper. There was a golden era of comics: The Far Side hadn't quite petered out yet, Bloom County had its wits, and Calvin & Hobbes was just plain golden. But those days are gone now. I open the paper and I'm stuck with the likes of Marmaduke and Garfield. And newcomers like Dilbert fail to provide new laughs.

Today the Internet provides a new publication model for comic artists. The costs are tied to the size of the audience, and content is determined by the artist and not a corporate comic syndicate. Success isn't necessarily about economics and eyeballs but rather about creating something that others enjoy and share with each other through email and IMs around the globe.

Unfortunately just because a comic can be shared doesn't mean it should. In fact, some of the most successful Web comics are simply terrible. They take the same stale lack of creativity found on the syndicated comic pages and combine that with mediocre art. Sifting through the thousands of comics out there takes time and dedication, and I'm just the sucker to do it!

Sifting through the thousands of comics out there takes time and dedication, and I'm just the sucker to do it!

Today I've decided to share a few of my favorite comics with you. They represent a cross section of comics both technically, literally, and artistically. And they make me laugh. So pop up your Web browser and follow me on my morning coffee comic run. If you're in a hurry, you can hop over to cmdrtaco.net/toonz.shtml, where I maintain my list. There aren't that many, but I think they're worth it.

PVP Online (www.pvponline.com) by Scott R. Kurtz is the saga of the employees of a gaming magazine. Solid art and entertaining characters, as well as a reliable daily production schedule, make this a top-notch comic. And the print comic is fun, too.

Errant Story (www.errantstory.com) by Michael Poe is different from most of the comics out there. Poe matured dramatically while working on his previous strip, Exploitation Now. Errant Story is a new story featuring a world of elves and magic told in a style very similar to Japanese manga. Three times a week you're given the next page in an interesting and well-drawn, ever-unfolding tale.

Penny Arcade (www.penny-arcade.com) by Krahulik & Holkins is the definitive "Two Guys Talking" comic. It features a colorful and expertly designed visual style, as well as many in-jokes for the gamer crowd. But what really makes the strip work is the hilarious dialogue and entertaining rants.

Megatokyo (www.megatokyo.com) by Fred Gallagher is another strip aiming to become an online manga. The art is among the best of any of the online comics, but the erratic schedule and oddly paced stories make it harder to follow.

Dork Tower (www.dorktower.com) by John Kovalic focuses more on the pen & paper gamer crowd but still drags in the laughs (provided you find jokes about d20s fun).

Little Gamers (www.little-gamers.com) by Christian Fundin and Pontus Madsen is a sort of a South Park of comics: Oversimplified and stylized children call each other names. But somehow this strip pulls it all off and consistently gets the laughs.

SinFest (www.sinfest.net) by Tatsuya Ishida is a true gem, stylistically similar to Calvin & Hobbes but created by a self-proclaimed "CEO and Revolutionary." This strip spouts out philosophy and one-liners in equal portion but looks excellent doing it. Coupled with a reliable daily publishing schedule, you have one of the most professional amateur comics out there.

Real Life (www.reallifecomics.com) by Greg Dean is a fairly classic style Web comic, with the hook being that it's simply about Greg and his friends and their real life. Of course with plot lines ranging from cloning themselves and traveling through time, the actual reality base of the strip is often a source of humor, but it often amuses. ■

You're welcome to disagree with me. . . . As always, I'm at foo@baz (malda@cpumag.com).

by Joan Wood

GDC Goes Mobile

Starting as gopher for the Emmy-winning team that pioneered live in-car TV cameras for the Indy 500, Joan became an independent video/sound engineer, technical director, and producer. Playing with Reality Engines and motion platforms led to co-founding Xatrix Entertainment, where she produced the two Cyberia games. Before 3D acceleration was trendy, she formed Mango Grits to develop hardware-only game Barrage for Activision. Since cashing out from SharkyExtreme.com, where she was co-founder and managing editor, Joan has retired.

At Game Developers Conference Mobile (gdcmobile.com) in March, the major players in mobile gaming (handset makers, service providers, and game developers) came together to discuss the next phase of the industry. They were joined by the usual entities also hoping to make money off the emerging platform: publishers, media analysts, and of course, journalists. The two-day conference was rather provider-oriented and phone-centric, but mobile gaming is still so new that each provider has been working out its own approach to everything from software platforms to publishing models, and so this was a chance for everyone to get a glimpse under the covers and do some measuring.

As even the big players admit, mobile gaming has not thus far been driven by consumer demand. It is being pushed by developers with content, providers with bandwidth, and handset manufacturers with jazzy new features like color screens and built-in cameras. If the camera phone (phone camera?) is the killer app for getting people to trade in their phone for one with a color screen, games and other downloadable content are what's going to let them feel it was a multipurpose upgrade. And service providers are thrilled about the prospect of putting micro payments for downloadable content right on your mobile phone bill. Which brings me back to developers.

> **Making games is way more fun than playing them.**

Many GDC Mobile attendees were kicking tires for the first time and could benefit from the mobile gaming 101 itinerary, but a few companies, like 3D mobile gaming technology developers Fathammer (www.fathammer.com), were already too busy taking meetings and making deals on the show floor to actually attend the mobile conference. And that right there is the rub. Once a market has emerged far enough to attract analysts, the bleeding edge entrepreneurs have already staked the ground out pretty well. Fathammer's mobile gaming middleware technology business model started with its advanced (compared to most mobile apps) 3D X-Forge game engine and tools, proceeded to internally developed game titles (both to demo the technology and to put interim bread on the table), and is topped off by offering customers the benefit of their experience dealing with the whole mobile games food chain. Available for license to game developers and as an OEM version for device manufacturers (Fathammer's customers already include Sega and THQ), X-Forge technology is under the hood of five of the launch titles for Nokia's N-Gage mobile game deck (specs at forum.nokia.com/main/1,35452,015_98,00.html).

Other GDC (gdconf.com) Highlights

Making games is way more fun than playing them, so The Sims always struck me as the best possible outcome when gamers get to play with really advanced level design tools, but Sims creator Will Wright's "Dynamics for Designers" session was so compressed and comprehensive (177 slides in 60 minutes, thesims.ea.com/us/will/gdc.html), it contained thumbnails of every element on the periodic table of game dynamics and how they interact with each other. Slide #14 is Mr. Wright's unified game dynamics theory chart, and if you already understand it, go make games. Please. We need more designers who have such fluency in the language of game dynamics and yet can also relate to an audience of human beings. The presentation alone will take weeks of analysis to translate back from accordion to encyclopedia. This is for high-level concept communication (lots of thinking and planning) for making games.

At the other end of the spectrum: The "Experimental Gameplay Workshop" (experimental-gameplay.org) session was all about semi-spontaneous fun. The main event was a string of games hatched at Indy Game Jam #1, an improvisational game development shindig where a barn full of veteran developers used an existing toolset that converts a PC-fed video projector and screen into a game platform and uses a video camera and player's shadows (yep, shadows) for the input device, to make more than a dozen games over a three-day period. "Make games" like you "make art" when you are five (before you figure out that the world doesn't take kindly to unfettered art-making): without judgment, self-censorship, and inhibition. The coolest one was an owl flight simulator where the player, as the owl, uses the shadow of his arms spread as wings to glide and turn through the terrain database projected on the screen. Totally simple and yet it got the biggest ovation, because it was just overwhelmingly fun. ■

Send shadow gestures to joan@cpumag.com

by Chad Denton

Road Warrior

Microsoft Comes Out Swinging, Tux Goes Mobile, Intel's Cool New Mobile Processor & More From The Mobile Front

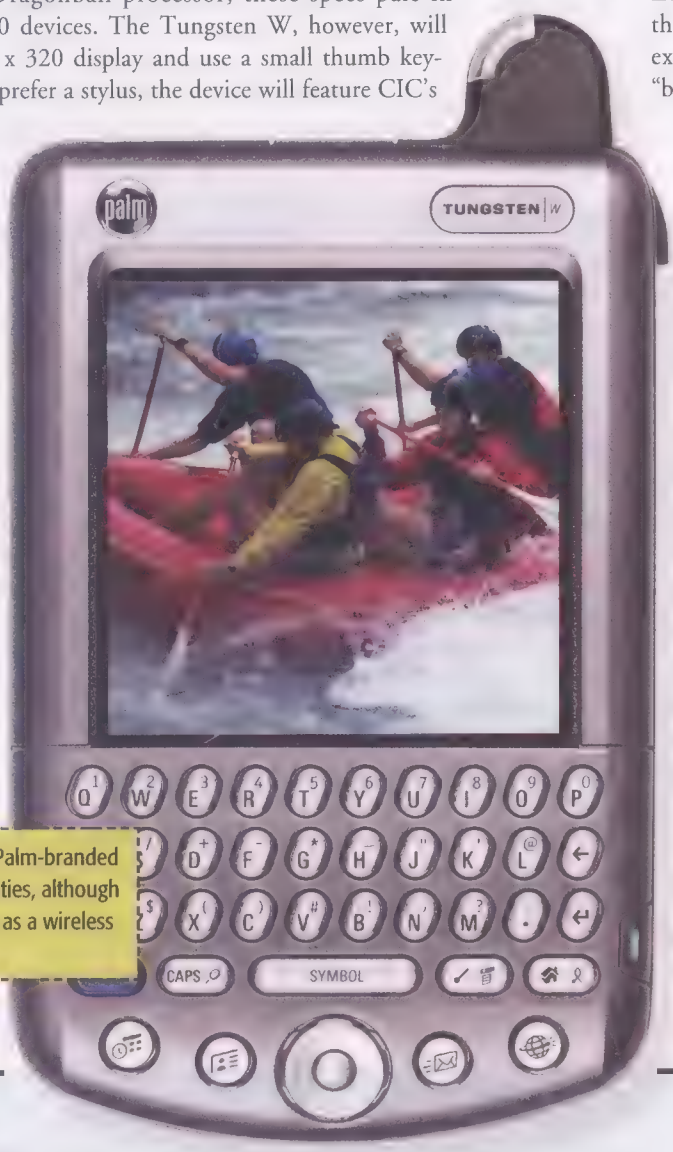
Palm Debuts Tungsten W

Palm (www.palm.com) has a reputation for being less adventurous with its hardware and software than some if its licensees. Sony, for example, was one of the first companies to feature a higher-resolution display, and such licensees as Handspring, Kyocera, and Samsung have been making Palm OS smartphones for some time.

Slowly, Palm is catching up. Palm OS 5 includes support for high-resolution displays, and the new Palm Tungsten W is the first Palm device to include voice capabilities. Admittedly, Palm envisions the Tungsten W as more of wireless data device than a phone, but the Tungsten W will do voice using an ear bud with a built-in microphone.

The downside of the Tungsten W is that it runs Palm OS 4.1.1 and utilizes an older 33MHz Motorola Dragonball processor; these specs pale in comparison to Palm OS 5.0 devices. The Tungsten W, however, will sport a high-resolution 320 x 320 display and use a small thumb keyboard for data input. If you prefer a stylus, the device will feature CIC's Jot handwriting recognition. Future Palm OS devices will use Graffiti 2, which is based on Jot, but the Tungsten W will not.

The Tungsten W will operate on GSM/GPRS networks and is currently available from AT&T Wireless (www.attwireless.com) for $549 without service. Available data plans range from $29.99 a month for 10MB up to $99.99 a month for 100MB. Voice plans, which are available separately, start at $19.99. An 8MB data plan is also available to voice subscribers for $19.99.



Palm's Tungsten W is the first Palm-branded device to feature voice capabilities, although Palm sees the device primarily as a wireless PDA rather than a phone.

Microsoft: Sendo So Litigious

Microsoft has fired back at UK mobile-phone maker Sendo (www.sendo.com) in what is quickly becoming one of our favorite legal soap operas. Anyone who says legal briefs are boring is right, but the mud-slinging does provide some entertainment.

If you recall, Sendo filed a lawsuit against Microsoft last December in the U.S. District Court for the Eastern District of Texas. Sendo alleged Microsoft had a "secret plan" to steal Sendo's technology and deliver it to Sendo's rivals.

In February, Microsoft answered the bell and came out swinging, insisting that the failure of the Z100 Smartphone project Microsoft and Sendo had worked on was Sendo's own fault. Microsoft cited email from Sendo employees who worked on the Z100 project. According to Microsoft, the employees described a number of executives assigned to the project as "blockers," and the product manager was jokingly referred to as a Nokia (a Microsoft rival in the smartphone market) employee. Another employee wrote in July 2002 that the Z100 was "a runaway train," and "there is nobody sensible in control and a train wreck is unavoidable." Microsoft alleges that marketing for the product was equally inept.

Microsoft goes on to suggest that Sendo had its own secret plan to divert funds and employees from the Z100 project to the Nokia Series 60 project, which Microsoft claims was in violation of agreements between Microsoft and Sendo. As a result, Microsoft filed a counterclaim against Sendo claiming breach of contract. Microsoft also filed a motion to dismiss the case, claiming "Sendo's complaint is long on rhetoric, short on facts, and deficient under the law." Microsoft added that the charges filed against it are nothing more than "good PR sound bites." In addition, Microsoft filed a motion to move the venue from Texas to Washington.

We can't wait for this thing to go to trial.

Streaming Video On Phones? Get Real

What better way to spend a cold winter week than kicking back on the French Riviera? Instead of ice and snow, there's the blue sky, warm sun, and sexy new handsets, as the 3GSM World Congress, held in Cannes last February, showed off mobile wares from a number of companies.

Among the many announcements made, RealNetworks announced an agreement to integrate support for RealAudio and RealVideo into Ericsson's new Content Delivery System. The deal lets network operators stream multimedia content across 2.5G and 3G wireless networks based on GSM technology.

A number of companies were also showing off new handsets. Siemens (www.siemens.com), for instance, showed off its SX1 Series 60 smartphone. Instead of just taking snapshots, the SX1 can record short video clips and transmit them to friends and family. Rather than a standard 12-key keypad, the SX1 positions its number keys in vertical rows on the left and right sides. The arrangement supposedly makes it easier to type messages. The phone also includes a joystick for navigation, an FM stereo, and an MP3 player. The SX1 is supposedly a tri-mode GSM phone, so we'll see if and when the SX1 makes it stateside.

Siemens' new SX1 smartphone garnered much attention at the 3GSM World Congress in Cannes recently. The phone features a unique keypad, can transmit video clips, and includes a FM receiver.

Tux Hits The Road

Lindows (www.lindows.com) has announced a $799 notebook PC running LindowsOS. Lindows aims to make Linux more appealing to those who don't know the difference between XFree86 and KDE and who could really care less. Using Linux certainly helps keep the notebook's price low, but it's the 933MHz VIA C3 processor that really helps keep the system's price down.

Aside from the processor, the specs are consistent with other budget systems. The Lindows Mobile PC includes 256MB of RAM, a 20GB hard drive, a 12.1-inch TFT display, built-in Ethernet, and an optional modem. The nice thing is the weight, which comes in at just less than 3 pounds. The notebook is available from iDOTpc.com (www.idotpc.com) and GearZoo (www.gearzoo.com).

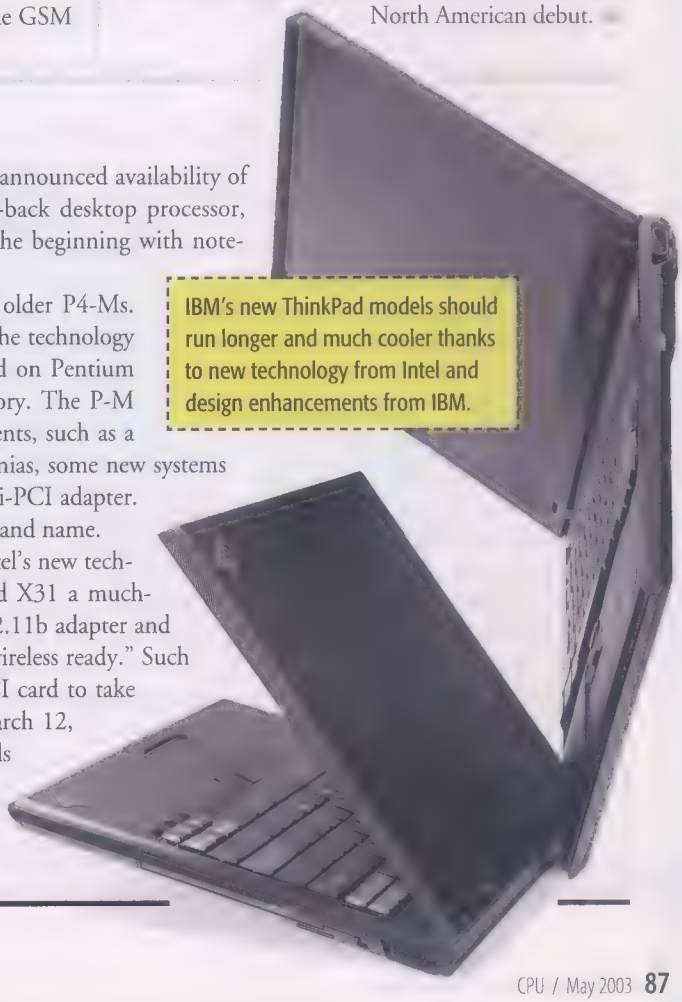
In other Linux news, Motorola (www.motorola.com) announced a new smartphone in February based on the Linux OS and Java. The new A760 will include a digital camera, video player, and MP3 player. According to Motorola, the phone demonstrates the company's newfound devotion to the open-source OS. Currently, Motorola plans on debuting the phone in Asia in 2003. No word on a North American debut.

Back In Black

On March 12, the wait for Banias ended as notebook manufacturers announced availability of models based on Intel's latest mobile technology. Instead of a scaled-back desktop processor, Banias, now known as the Pentium-M processor, was designed from the beginning with notebooks in mind.

The new processor requires less power and generates less heat than older P4-Ms. This means longer battery life and smaller, cooler running notebooks. The technology should be especially beneficial to lightweight notebooks that have relied on Pentium III-M processors, slower front side bus speeds, and older, slower memory. The P-M does run at a slower clock speed than the P4-M, but design enhancements, such as a 1MB L2 cache, look to offset the slower clock speed. In addition to Banias, some new systems may also feature Intel's new 855 motherboard chipset and Calexico mini-PCI adapter. Only models with all three components will bear Intel's new Centrino brand name.

IBM (www.ibm.com) announced new ThinkPad models based on Intel's new technology. The faster bus speed and memory will give the new ThinkPad X31 a much-needed performance boost. Some X31 models will also use the Intel 802.11b adapter and bear the Centrino brand. Other models will use Cisco gear or will be "wireless ready." Such models include a built-in antenna, but users will have to add a miniPCI card to take advantage of wireless networking. The ThinkPad T40, also released March 12, is entirely designed around the P-M and new chipset. Some T40 models will bear the Centrino logo; others will have different wireless options. The T40 is only about 1 inch high and weighs just about 5 pounds fully loaded. T40 and X31 models will start at roughly $2,000.



IBM's new ThinkPad models should run longer and much cooler thanks to new technology from Intel and design enhancements from IBM.

At Your Leisure

by Samit G. Choudhuri & Chris Trumble

Plug In, Sit Back & Fire Away

The entertainment world, at least where it pertains to technology, morphs, twists, turns, and fires so fast it's hard to keep up. But that's exactly why we love it. For the lowdown on the latest in PC entertainment, DVDs, consoles, and just stuff we love, read on.

Command & Conquer Generals
Commanding Is Easy, Conquering Is Tough

Much like Freelancer (see next page), Command & Conquer Generals comes from an excellent pedigree. Yes, we've played the previous C&C iterations (along with the original Dune 2: Building A Dynasty release back in 1992). Back then, Dune 2 was a unique, breakthrough game. Today, RTS titles are a dime a dozen, with some bright stars littered throughout. This is C&C's first foray into the 3D-graphics realm, and it doesn't disappoint. The incidental animations lend a lot of ambience (tanks knocking down trees, gun turrets on the back of pickups, and much more). We also like that the cut scenes use the game's gorgeous in-game engine.

How's the gameplay? We were worried when C&C Generals' PR rep didn't answer our requests to send product for review. (We panned C&C: Renegade in our May 2002 issue for its subpar AI and more, so that may be why.) So, we bought the game and found it rather enjoyable. This isn't your daddy's C&C. The game is no longer based on pure fantasy scenarios; it takes big pointers from the current political climate (maybe closer than developers Westwood intended). You'll find the game's units instantly recognizable: Humvees, Tomahawks, A-10 Warthogs, and more.

This GLA ambush will leave no survivors.

The Generals' element comes via a player's gained experience destroying units and buildings (units are upgraded based on combat experience). As the player, you're promoted as you gain command experience; promotions get you points to spend on upgrades. Tactically, it works well. The game features three sides: United States, China, and GLA (Global Liberation Army); each side has unique upgrades. The developers nicely balance the sides, making gameplay more appealing. This is Westwood's last hurrah, and it's going out with a bang.

Command & Conquer Generals (PC)
$49.95 • Electronic Arts
generals.ea.com

DVD Byte by Todd Doogan

It's hard to believe that a film like "Who Framed Roger Rabbit?" was made without the benefit of a single bit of CGI, but it's true. The tale of a cartoon rabbit accused of a crime he didn't commit and the grizzled P.I. dedicated to helping him out of the jam was created using thousands upon thousands of hand-drawn cels—just like every traditional animated cartoon that inspired it. This DVD really sheds a lot of light on the hows and the whys of this film, and it's a fun ride, too. The film is presented in two formats on two separate discs.

First we get a full-frame presentation (the so-called "family friendly" version) with no bells or whistles, aside from the original three theatrical shorts created after the film's release in 1988 and a kids' set-top game. The other disc is for true fans, featuring 16 X 9 widescreen, commentary, featurettes, a subtitle-based /pop-up video styled fact sheet that runs while watching the film, before and after video, and a deleted scene. If you love this film, or cartoons in general, this is definitely a must-own set. The transfer is gorgeous (even if some of the off-color jokes have been digitally "cleaned up"; see www.digitalmediafx.com/Columns/JimHill/01insidejoke.html for more on this), the sound is delicious, and the extras are simply wonderful.

Freelancer
You'll Make Do Solo Without An Elite Crew

We've played through all the Wing Commander and Privateer games and have delved extensively into X-Wing, TIE Fighter, Frontier, I-War, and the all-time godfather of space sims, Elite. That said, it's time to let you know that Freelancer is finally here after being in development at Digital Anvil for about six years. The best part is that the game is very playable. Also, the trepidation we felt regarding the keyboard-mouse combo control (instead of the typical joystick for the space-sim genre) was put to rest within a half hour of play. Freelancer is here, but it's not quite your typical space sim because you focus more on the strategic slant of fighting rather than pure dog-fighting.

Freelancer is attractive but not the graphical breakthrough it seemed to be back in 1999.

You take on the role of Trent shortly after he narrowly escapes with his life during the game's intro (watch it because it furthers the coming storyline). The game starts proper with you having nothing. You will start taking on missions that will form the course of your destiny. There is an overriding and very intriguing storyline that is furthered by two hours' worth of cut scenes, but along the way, you will still have the choice to follow your own path. Plus, upon completion of the storyline, you'll be able to continue playing in a living, breathing universe where you'll be able to follow a profession by your play style (bounty hunter, trader, etc).

After you get past the mental hurdle of using a keyboard-mouse combo scheme for control, you'll begin to miss the radar. It's odd not having 3D radar to show you the position of enemies and friendlies. Yeah, you get by without, but it would have been nice to have the option to toggle on or off.

A slightly bigger gripe is the repetitive question, "Are you new here?" each time you meet someone (or so it seems). If only there were some way to toggle this question off or, better yet, have a bit more variety. The rest of the voice acting and plotline is excellent, so it's a pity this detracts from the overall package. The voice acting and music are very solid, but this one phrase becomes incredibly tiresome after a while. Graphically, the game is above average but doesn't have the cutting-edge visuals we saw back in 1999. We wish Digital Anvil had added Simple and Advanced modes to give hardcore space simmers the option to toggle on more advanced options, but overall there's not a whole lot else to complain about; the game is easy to pick up and will provide many, many hours of pleasure.

Freelancer (PC)

$54.95 • Microsoft Game Studios
www.microsoft.com/games/freelancer

Indiana Jones And The Emperor's Tomb
Crack That Whip

There are lots of games out there based on movie licenses, but let's face it: Few movie characters are as well-suited to starring in a video game as Indiana Jones. After all, if it weren't for Indy, it's unlikely that Lara Croft and the Tomb Raider games would ever have come along.

Indiana Jones and the Emperor's Tomb is Indy's first outing since the advent of the latest round of game consoles. The Xbox version (which we looked at) hit the shelves first, followed by the PC version. As you read this, a PS2 version will be available, as well. This third-person action game follows a pretty typical Indy storyline: In one of his expeditions, Indy acquires an ancient relic that turns out to be more than just a pretty historical bauble. In fact, it's one of three pieces that can give the bearer access to the long-sealed tomb of one of China's greatest emperors. Of course, there's lots of valuable stuff stored in a place like that, but what really has people (including the Nazis and an assortment of Chinese thugs) fired up is the tomb's greatest artifact, the Heart of the Dragon. This item is a black pearl that is said to have the power to control minds, so you can imagine why would-be world dominators want to get their hands on it.

Indiana Jones is about as cool as it gets.

As you might suspect, the game takes Indy to all sorts of exotic locations, and they all look pretty good. As the game progresses, you'll notice some technical glitches here and there (some clipping and a few weird collision issues), but overall, developers The Collective did a nice job rendering Indy's world in vibrant 3D. Indy is fairly easy to control, and you'll enjoy taking on his rivals with a variety of weapons and bone-crunching hand-to-hand combat.

The game features Indy's trademark musical themes taken from John Williams' theatrical scores, and the voice work isn't half bad. In fact, there's not much to dislike about this game aside from the aforementioned occasional glitches, and these won't derail the fun you'll have guiding Indy through his quest.

Indiana Jones And The Emperor's Tomb (Xbox, PC, PS2)

$49.95 ($39.95 for PC) • LucasArts
www.lucasarts.com/products/indiana

Vexx
Now THAT's Attitude

Developed by Acclaim's excellent Acclaim Austin team (formerly Iguana Entertainment, for those of you who keep up with such things), Vexx draws on a healthy dose of platformer conventions and blends them with a considerably darker feel than usual. This interesting look and feel is apparent when one takes a gander at the game's eponymous hero, who sports a quasi-cartoonish look but is clearly out for blood. And no wonder; the evil Shadowraiths and Dark Yabu, their leader, have literally torn his world apart.

Of course, this is hardly the first game whose protagonist has to fight off hordes of evil invaders against all odds. But it is probably the first time the bad guys have killed the hero's grandfather in front of the young lad and then proceeded to torture the old man's soul instead of letting him rest in peace. So clearly, Vexx has some revenge issues, and as a result you won't find much of the bouncy, happy, funny stuff you get in most platformers, 3D or otherwise. (There are bits of comic relief here and there, mostly in the form of silly bosses [the ponderous Sumo-Kin immediately springs to mind] and some of the stuff your enemies do when you beat them down.)

With clenched fists and a toothsome snarl, you can tell Vexx is one angst-ridden little dude.

Aside from its somewhat darker outlook, though, Vexx doesn't stray too far from platformer traditions. You'll help Vexx run, jump, climb, and swim his way through the game's nine main levels, each of which represents a big chunk of Vexx's once spherical planet Astara. Vexx punches, kicks, and blasts his foes in familiar ways, and (of course) collects all sorts of items that help him progress from level to level.

Vexx isn't breathtaking technically; the game's graphics and sound lack some of the gee-whiz value you'll get from other current games, and at times we found its camera controls downright frustrating, especially in tight quarters. The camera control problem, however, is something the majority of 3D action games struggle with, and what the game lacks in technical polish it more than makes up for in great music, friendly controls, and clever design. The game's levels provide plenty of variety, and Acclaim Austin wisely provides both accessibility for inexperienced gamers and a challenge for the initiated. You can probably collect enough Shadowraith hearts to beat the game without taking on the really hard-to-get ones, but if you're up for the challenge, Vexx provides some of the toughest platform action (and puzzles/riddles) out there.

Vexx (PS2, Xbox, NGC)
$49.99 • Acclaim
www.vexxthegame.com

Resident Evil 2 & Resident Evil 3: Nemesis
Ghasts From The Past

RE2's Leon Kennedy finds out what happens when you flush baby alligators down the toilet.

Early this year, Capcom released the second and third installments of its longtime hit series Resident Evil for Nintendo's GameCube just a couple days apart. If you read our reviews of Resident Evil 0 (February 2003) and the remake of Resident Evil (July's 2002), you know we loved every minute we spent blasting our way through them.

We should point out that RE2 and RE3 aren't remakes with all-new graphics, areas, and monsters. In fact, they're pretty much direct ports of the games circa their Sega Dreamcast releases, which had some touched-up looks here and there but were largely unchanged from their original PlayStation releases. But there's quite a bit of fun left in these titles, whether you're a nostalgic RE fan or are new to the series.

RE2 follows Leon Kennedy and Claire Redfield as they try to survive in Raccoon City following the events of the first game. The game's play mechanics are standard fare for the series, as are many of the puzzles and monsters, but the game has a great story and a character Zap System to give it added replay value. You can beat the game either as Leon or Claire, then load your saved game and play through with the other character; actions you took the first time around affect your options the second time around.

RE3 takes place both before and after the events in RE2, and features Jill Valentine, the tough heroine from the first game. Jill is trying to get out of Raccoon City but has a little trouble when she runs into Nemesis, an enormous mutant critter with a rocket launcher. RE3 has a few control elements that were new to the series back in the day, such as negotiating staircases without having to push the action button and sitting through transition scenes and the ability to execute dodges and 180-degree turnarounds when in tight spots.

Both titles are looking pretty dated compared to current fare, especially the Resident Evil remake and RE0, but they still sound pretty good and are important chapters of the RE saga. If you haven't played them before, you owe it to yourself to give them a try, especially if you're a fan of survival horror games.

Resident Evil 2 & Resident Evil 3: Nemesis (NGC)
$39.95 each • Capcom
www.residentevil.com

Hot Shots: The Beauty Of The Game

Yeah, we know it's all about the gameplay. Sure, there are those who would have you believe graphics are relatively unimportant in the greater scope of things, but if you read *CPU* mag, you probably already know those folks are off their collective rockers. We want great gameplay combined with stunning graphics, and here are two upcoming games that show promise. Watch for them.

IL-2 Sturmovik: Forgotten Battles (PC). From Ubisoft comes a new standalone flight sim. The original IL-2 Sturmovik was an excellent blend of accuracy and playability. Now, you can expect 20 new missions, more than 30 new flyable aircraft, and much nicer graphics. Want to learn more about the game and see more images? Visit www.il2sturmovik.com.

Infinite Loop

Hey, I Said That First!

Remember when these terms were new? Match the term to the first year a Usenet member referenced it.

1. A computer power user
2. e-book
3. FOLDOC
4. Description of online world as "Netscape"

A. 1988
B. 1990
C. 1992
D. 1995

Source: Google Groups, http://groups.google.com

Answers: 1. C, 2. B, 3. D, 4. A

Software Tips & Tricks

Playing With Adobe Photoshop 7 & Jasc Paint Shop Pro 7

Everyone is a digital artist now. Because many of us are Webmasters of one sort or another, we all have to think about graphical design and get our hands dirty with the likes of Jasc Paint Shop Pro 7 and Adobe Photoshop 7 to create Web page backgrounds, arresting screen images, logos, and text buttons. With that in mind, we dove into the widespread library of imaging tips that we collected recently, tweaked a few, and updated others for these latest versions of the most popular graphics programs.

Paint Shop Pro: The Art Of Letters

For logos or buttons on Web sites, nothing beats an exotic or customized text look, and Paint Shop Pro 7 has some of the most versatile advanced type tools available.

Image in text. One neat trick is to create text that looks as if the letters were cut from an underlying image. To do this, open the image you want to use. This can be an interesting background (we're using the American flag) or even a pet photo, a landscape image, or anything that you can pull into PSP. Go to the Color Palette and set Style/Background to whatever background you want to end up with beneath your cutout text. We chose black to highlight the red, white, and blue.

Click the Text tool icon and click anywhere on the image to open the Text Entry dialog box. You will want to choose a blocky and thick typeface such as Impact so that the superimposed image is recognizable in the type. Make sure the Selection and Auto Kern options are selected. Then in the Styles section, set the Stroke value to Null and the Fill setting to Solid. Now type in your letters and click OK.

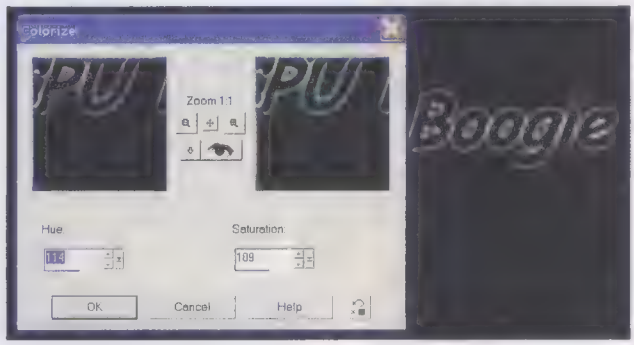
The letters will show up in outline form on your image, but we need to position this just right. Click the Mover icon but don't try to reposition your text simply by left-clicking within the selection and dragging it around. This will lift the current underlying image up onto your text but also pull it out of the background image, which complicates the next step. Bring the Mover tool icon over your text and right-click and hold in order to reposition the text over the image so that the background image looks right within the letters. Release the right mouse button to lock the text into position.

Then from the Selections menu, choose Invert. Now press the DELETE key to replace the original background with whatever background color you have set and see your letter cutouts. In order to see your final cutout letters, save the work to a new file (otherwise you will permanently alter the background image you used) and reload the file.

Quick Tip: If you haven't discovered it already, your mouse scroll wheel controls the zoom function in PSP, so it changes the image ratio up or down from 1:1.

Vectorize it. You can play endlessly with text characters by converting vector text into shapes. For instance, use the Text tool and click your background surface to bring up the Text dialogue box. Select the Vector radio button in the Create As section, type in your text, and click OK. With the text on-screen, click the Object Selector tool and click your vector text to choose it, then right-click and choose Convert Text To Curves.

If you choose As Single Shape, the entire text entry will be treated as a single vector object that you can fill with texture, stretch, and color. Right-click the vector shape to open its Vector Properties dialog box. Here you can apply textures and color. If you don't like this Single Shape option, you can back out of the selection by using the undo command (CTRL-Z). Then try choosing As Character Shapes from the drop-down menu instead. It gives you even more flexibility because this command makes each letter an independent object. Now you can use the Object



You can use the Blur filter and some simple commands to create "Boogie Nights" text that glows against a dark background.

Selector to call up the Vector Properties dialog box for each character, so that you can change its look or color independently. You can also choose each character and stretch it separately, too.

Glow text. To get that '70s neon backlighting for your letters, start a new image and set your background in the New Image dialog box to White. Activate the Text tool and click anywhere on your screen to bring up the Text box. Select the Floating radio button in the Create As section, type in your text, and click OK.

Right-click the text to set it on your background and then choose Blur and Blur More from the Effects menu several times to make the edges fuzzy. Now choose Edge, Find All from the Effects menu to make much of your screen black. From the Colors menu, choose Histogram Functions and then Stretch to complete the effect.

Now choose Colorize from the Colors menu. In the Colorize dialog box, set your Saturation level to the middle of the slider and experiment with different hue settings to find the right color for your neonized letters.

Photoshop 7's Favorite Tricks

Over the years, Photoshop masters have invented thousands of tips for doing everything from gently tweaking digital images to radical effects processing. Here are just a few of the tools we've picked up along the way. You may want to keep them at the top of your Photoshop tool kit.

Punched-up photos. Mediocre digital cameras and poorly balanced scans can produce flat or washed-out pictures. Trying to pop up the colors with the simple saturation tools in Photoshop can make matters worse by tingeing whites and throwing off the color balance elsewhere in the shot. Instead, use the overlay function in the Layers tool to intensify the color.

Open the image you want to modify, which will make it your background layer. Right-click this background layer in the Layers tool window and choose Duplicate Layer. In the Duplicate Layer dialog box, you can rename the background copy if you want; otherwise just click OK to accept the default name. Now with the new background copy highlighted in the Layers tool window, choose Overlay from the drop-down menu to set this layer to Overlay. This effectively doubles the color intensity but it doesn't actually alter any of the color values. To moderate this effect, use either the Opacity or Fill sliders also in the Layers window.

Be a sketch artist. You can turn just about any color image into a line sketch with, of all things, the Blur filter. Load your image. For the best results with most complex color pictures, we found it best to first convert the image to standard black and white by choosing Mode,

By using layers and a combination of layer edging styles, you can create this dimensional cutout box to contain titling text or Web navigation.

Registry Tweak

Rebrand Media Player

You can customize the Windows Media Player title bar to read, "Windows Media Player provided by *name of your choice*" by adding the following keys and settings to your Registry. In the Registry Editor, highlight HKEY_CURRENT_USER\SOFTWARE\POLICIES\MICROSOFT and create a new key called WindowsMediaPlayer. In this new key, create a String Value (REG_SZ) named TitleBar. Double-click the new Value Name and fill the Value Data text box with whatever label you want to add to the WMP title bar, such as a company or personal name or anything you like. Next time you start you player, it will carry the new branding.

WinXP Tip Of The Month

Keyboard & System Properties Shortcuts

On-screen keyboards aren't just for Tablet PCs or PDAs. If your real keyboard goes out on you or you just want to play with a different way of interfacing with Windows, open the Run dialog box from the Start menu and type **osk** to bring up an on-screen keyboard.

And here's another gem: If you are tired of drilling into your Control Panel to access the System Properties dialog box whenever you need to tweak performance settings or check your hardware configuration, just press the WINDOWS-PAUSE key combo to open the dialog box immediately.

You can use the Smart Blur tool in Adobe Photoshop 7 to reduce a color image to an etching.

Grayscale from the Image menu. Click OK to tell Photoshop to discard the color information.

Then, go to the Filter menu and choose Blur, Smart Blur. In the Smart Blur dialog box, use the drop-down menus to set High quality and Edge Only mode. In the preview window, this will change your image to a white-on-black outline. Adjust the preview window zoom to reveal as much as possible of your image. Coloration and contrast will make every instance different, but start with your Radius setting somewhere between three and 10 and your Threshold at about 25. Play with both so that the outer edges of the figures and the inner detail are apparent but don't bleed together. Click OK to confirm the change.

Now choose Adjustments, Invert from the Image menu to invert the image to black lines on a white background. You can use the resulting line drawing as is or to provide a base for a number of other Filter effects, especially tools in the Filter/Sketch submenu, such as Bas Relief, Notepaper, and Chalk & Charcoal.

In addition to creating a cool effect, this line drawing trick can convert many personal photos or images from the Web into kids' coloring pages. Just turn your digital image into a black-on-white sketch, enlarge it to fill an 8 x 10 sheet, and print it out. Now your kids can color Grandma.

Cooler covers. Why settle for a crude image box planted in the middle of your document's cover page when you can use a full-page graphic with a fancy 3D cutout area for descriptive text or Web menu items?

Load in your background graphic. We'll make a simple corner area in this example by choosing the Rectangular Marquee tool and selecting the bottom right corner of the image. Note that you can also use the Rectangular or Elliptical Marquee tool to etch this effect across the entire side of the image, which is a great place to plant Web navigation buttons. Now choose Inverse from the Select menu to change your selection box to contain the remaining portion of your image. Right-click within this selected area and choose the Layer Via Copy command to create a new layer that contains all but your cutout area.

In the Layers window, select your background layer and press CTRL-L to open the Levels dialog box. On the Output Levels gauge, move the left slider to the right to lighten up the cutout area to your liking. Generally, bringing the slider nearly halfway across will lighten up the area enough to make text clear but leave the image still visible. Click OK.

Now right-click Layer 1 in the Layers window and choose Blending Options. In the Blending Options dialog box, you can experiment with different ways of contouring the border between the lightened area and the normal part of your image. Try clicking the Drop Shadow checkbox and setting Opacity to around 60%. This will give you a pleasant dimensional shadow within the lightened area. You can enhance the dimensional effect by also clicking the Bevel And Emboss checkbox and then clicking the Contour checkbox. This adds a bevel around all of the edges of the normal portion of your image.

From here, you can add text to the box or use the lightened area for placing navigation buttons on a Web page. CPU

by Steve Smith

Infinite Loop

Pirates Of The Mississippi

The Business Software Alliance conducts an annual survey of software piracy in the United States, broken down by state. See if you can guess which states are the Snidely Whiplashes and which are the Dudley Do-Rights.

Source: Business Software Alliance, October 2002.

Answers: Bad guys: Mississippi, 48.7%; Wyoming, 48.2%; West Virginia, 47.6%.
Good guys: New York, 11.9%; Illinois, 13.0%; Connecticut and Wisconsin, 14.1% each.

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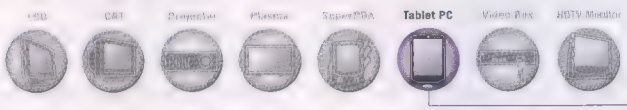

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Warm Up To Penguins

Create & Edit Images With The GIMP

Most versions of Linux bundle the wonderful graphics program GIMP (GNU Image Manipulation Program), an image-creation and editing program arguably on par with Adobe Photoshop. In 1997, The GIMP was hailed as the first end-user power tool for Linux, and the app has only gotten better since. Unfortunately, as with most powerful programs, The GIMP isn't the easiest software to use.

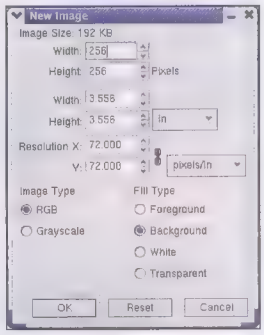
Often, the quickest way to gain an understanding of a complex tool is to just start using it. So, in a two-part series of articles, we'll walk you through creating a multilayered image using The GIMP's various drawing tools and apply effects and other special features. If you don't have The GIMP installed, look to your Linux distro's documentation for how to add it, or you can download it at gimp.org. The GIMP is a GUI tool, so you'll need to have your GUI up and running.

The GIMP's main menu is where you'll select your tools and manage the process for a given project.

Project Underway

We'll start our project using the main GIMP menu. To open a blank image, select File and then New to open a New Image window. Unless you're good with pixel math, it's usually easiest to work in inches. In the window's second set of Width and Height boxes (with the "in" drop-down menu), type 5 and 5 for a 5-inch wide x 5-inch tall image. The upper Width and Height values will also change to reflect the number of pixels required for the requested size (360 pixels in this case). We'll leave the Image Type as RGB, and leave the Fill Type as is.

If you are curious what "Fill Type" means, select Help from the main menu and then select Context Help. Click in the New Image dialog box. This opens help information for this dialog box, which includes a description of Fill Type. Now click OK to open a new 360- x 360-pixel image.



The GIMP's New Image dialog box is where you'll assign the properties for the image file you want to create.

Before we do anything else, we need to save the document. Right-click somewhere in the blank image to access The GIMP's main context menu. Select File and then Save As to open the Save Image dialog box, and then browse to the location on your system where you want to save the image. Give the image a name without an extension. We will name ours SampleProject.

Now click the Determine File Type drop-down menu to access the image types available. We won't select JPEG, however, as it's not a format that's ideal for an image in progress. (Each time you save a JPEG image, it recompresses and loses a bit more detail.) Instead, we'll use a rich image format, such as TIFF, for this project. Notice that the extension is applied in the dialog box after the file name once you've made your selection. The Save As TIFF dialog box opens. Leave the None option selected and click OK to complete your save. From this point on, you can press CTRL-S to save the file, as long as the file window is the one you have highlighted.

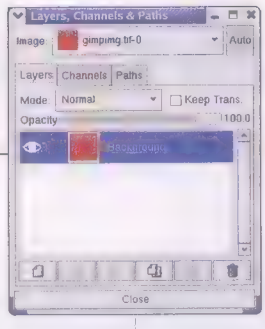
(To learn more about TIFF-compression options, click Help and then the Index tab and scroll down to the TIFF entry. Click that entry, and you'll see the information you want.)

The Interesting Stuff

Now that our file has been created and saved, it is time to get down to business. We will be working in layers, which means creating an image made up of many components, where each of the components is actually a separate image piled on top of another. The process is similar to how an animation is done using a series of transparent cells.

Let's say we want a big part of our image's background to be a different color than white. The best way to do this in layers is to coat the entire background in the color we want and then work on another layer on top of it. So, look to the bottom left of the main GIMP menu for the foreground/background color launcher, which looks like two windows stacked on each other. Click the top window and the Color Selection dialog box will open.

There are several ways to select colors and aspects of colors in the GIMP. Take a moment to experiment with the radio buttons, tabs, and color bars within the



The GIMP's Layers, Channels, & Paths dialog box lets you divide your image into manageable pieces.

Color Selection dialog box. When you are finished, click a colored area to choose the color you want. The color you select will appear in the dialog box's color bar and in the GIMP's main menu's color section on the top window in the stack. Click Close or minimize the Color Selection dialog box.

In the GIMP window, find the fill icon, which looks like a bucket with paint spilling out. Click the icon, and then click anywhere within your blank document. The entire white area will change to the color you've selected.

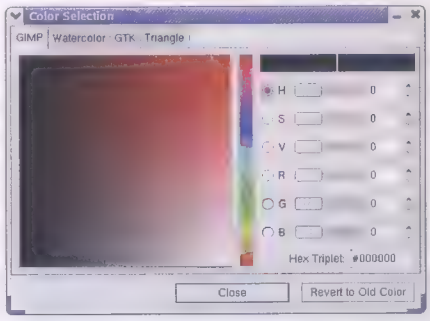
Like a cartoonist, we want to leave this nice and clean and layer other images on top of it. Right-click over the image to open the main context menu. Select Layers and then Layers, Channels, & Paths to open the Layers, Channels, & Paths dialog box, which we will refer to from now on as the Layers dialog box. The solid-color image we currently have is properly labeled as Background Layer 0.

Now, either minimize or close the dialog box, depending on your preference. On the bottom left, you'll see the New Layer button, which looks like a blank document. Click it to open the New Layer Options dialog box. This dialog box should remind you of the New Image dialog box, except here you can assign a name to the layer and the options are filled in for use as a layer to match up with the previous layer(s). We'll leave the Layer Fill Type set to Transparent here. If not, we'll lose our nice, colorful background.

For convenience's sake, we'll assign this layer with the name Layer 1 and click OK. This layer is added above the first in the Layers dialog box and is selected. We're now working in Layer 1, and nothing we do will affect Layer 0 until we select that layer to work within.

A handy thing about layers is you can do the big, broad items on the lower layers and keep all your detail work for the top. So, we'll add a large geometric item on Layer 1. We'll start by looking to the bottom right of the main GIMP dialog box, next to the color selection panes. The dot in the corner symbolizes the Active Brush, which is the tip of the implement we're using to add content to our drawing.

Click the Active Brush item to open the Brush Selection dialog box. Here, you'll see a selection of dots of various sizes, geometric objects, pictures, and more. For items larger than they appear in the menu, you can click them while holding down the mouse button to have the object expand to the size it will actually appear. Select one of these larger objects, perhaps the 79 x 79 pixel sphere, and then minimize or close the Brush Selection dialog box. Note that the item you select replaces the dot on the main GIMP dialog box.



The Color Selection dialog box is where you'll choose the color you want to work with at each stage of your project.

Now, we'll return to the Color Selection dialog box and choose a color that contrasts with our background. After selecting the color, we'll click the pencil icon in the main GIMP dialog box. Now, click anywhere in your image to place your object with this tool.

Until We Meet Again

Next month, we'll continue our project, applying more layers to the image and applying effects. Until then, save a new copy of this file with a different name and experiment with what you've learned so far. CPU

by Dee-Ann LeBlanc

Infinite Loop

Gruesome Viewing Habits

As "Joe Millionaire" proved, people sometimes have bizarre viewing habits. But never before have we encountered the gruesome proposition set forth in a Dutch film called "Necrocam" (www.omroep.nl/vara/necrocam), in which a group of teens has to cope with the death of a friend and that friend's last wish to be buried in a Web cam-equipped coffin (thus the term "necrocam"). Screenwriter Ine Poppe got the idea when her techie 15-year-old son said that he wanted to be buried with a Web cam after his death. Poppe has expressed no desire to pursue the concept in reality, and whether others would find it worthwhile seems doubtful. Even Web cam-obsessed Jennifer K. Ringley (www.jennicam.com) thinks the idea crosses a line. "I find that watching a person who's not performing to have a low enough threshold of interest," says Ringley. "Watching a person who's not even moving might be pushing it a bit too far."

SOURCE: NEW YORK TIMES

Killer Hardware Tips

iPod Hacking, Dual Displays & Trippy Images

If you're a user who can't leave things alone if there's a chance you can make them better, even if it means bucking the norm, read on. We have some tips and tricks that just might make you more productive.

No, It Doesn't Run X

When Bernard Leach, a software engineer living in Germany, received an iPod as a present, he asked himself what any self-respecting hacker would ask: I wonder if it can run Linux. The iPod didn't (the device uses a proprietary OS), but thanks to Leach, it now can. Leach's Linux on iPod project (ipodlinux.sourceforge.net) is an open-source endeavor to port the Linux kernel to the popular portable MP3 player.

The iPod kernel is based on uClinux (www.uclinux.org), a derivative of the Linux 2.0 kernel intended for embedded systems. The uClinux kernel is designed specifically for microcontrollers without MMUs (memory management units).

The iPod is a closed platform, with precious little technical information available to the public. So, Leach's project has meant a lot of trial and error. The system offers FAT file system support, audio output, and access to the frame buffer, buttons, and scroll wheel, but it doesn't yet support FireWire, the HFS+ file system, power management, and several other features of the iPod hardware. There's no interface to type yet, "although there is one proposal already that uses a similar methodology to that used in mobile phones," says Leach.

Installing Linux on an iPod means a leap of faith: You need to overwrite the iPod's native OS. "To switch back, it is necessary to restore the original OS from a backup. Some portions of the native firmware remain, however. For example, the boot loader and, importantly, the 'diskmode,' which provides the FireWire services," Leach says.

Linux booting on an iPod is possible if you're willing to take a leap of faith with your device.

Installing Linux involves preparing a build environment on a PC that can cross-compile for the iPod's ARM processor. Next, you need to build the kernel on the PC and copy the kernel binary to the iPod. A file system is necessary, so copying a Linux file system from the PC and mounting it on the iPod is next. Finally, you can build and install BusyBox (www.busybox.net), a program that emulates Grep, gzip, and other common GNU user tools. From there, you can use the PC's cross-compiler to build more applications for the iPod. Full instructions are on the project's Web site.

Applications tested with the setup include the MAD MP3 player and Tremor, an Ogg Vorbis player. Neither app can play music in real-time yet, meaning distracting lulls in the tune. Leach expects speedups, however, as the software is optimized and the platform better understood.

But Leach's real aim is to take the iPod beyond playing music. In time, the device could work as a PDA, remote control, or portable hard drive. "I'm looking forward to being able to store digital photos on my 'Pod when I'm traveling. But for me at the moment, learning about the Linux and iPod internals is the main motivation," Leach says.

After All, You Have Two Eyes

They say two heads are better than one, and if you've used a PC with two monitors, you'd probably agree. Adding a second monitor to a PC is an easy hardware addition—if there's room on your desk, that is.

Aside from obviously needing two monitors, you'll need video cards to drive them. Many cards, including the RADEON 7500 and Matrox G450 series, support dual displays, often offering one DVI port and one VGA port. If you have two VGA or DVI monitors, you'll need an adapter cable to use both ports.

If you have an extra video card, you can use it instead. Dual displays work equally well with two video cards—one AGP and one PCI card or two PCI cards. The main drawback is that two-card setups use an additional precious PCI slot. At least one of the cards needs to explicitly support dual-monitor setups. In other words, it must be willing to share hardware resources.

The card the PC discovers first at boot time is the primary video card. In two-card setups, you may have to experiment to find which one should be primary. If you have one AGP and one PCI card, the PCI card will generally be the primary card. (The PC's BIOS setup utility may let you choose which slot to initialize first.) With two PCI cards, the one closest to the CPU, in the lowest-numbered slot, will be the primary card. All things being equal, try to designate the better card as the primary display.

Z-Anaglyph, a freeware tool, created this 3D image of Mars' surface. Required headache-inducing glasses to actually view it clearly aren't included with this magazine.

Support for multiple displays is built into Win98/Me/2000/XP. Win95 and WinNT don't officially support multiple monitors, although proprietary video drivers can work around this. After plugging a second monitor into your PC, in the Display Properties dialog box, choose the new display from the drop-down menu and select Extend My Windows Desktop. You should now be able to move windows and icons to the new screen. The Use This Device As The Primary Monitor option tells Windows the display that windows should appear on.

Adding a second monitor in Linux can be trickier, depending on your distribution and window manager, but it certainly can be done. The Multiple Monitors with X Mini Guide (tinyurl.com/67vt) explains how. Details for using multiple screens with Mandrake are at www.realtimesoft.com/multimon/linux.

Mac users, don't sweat it. Mac OS has supported multiple monitors since 1987. If your desktop Mac has room for a second video card, you can plug it in and attach the second monitor without fuss. Use the Monitors o: Displays control panel to adjust their relative locations and set the primary display.

Two monitors aren't the limit, by any means. Quad-port video cards are available from Appian, Colorgraphic, Matrox, and other manufacturers. Windows' Display Properties dialog box has an upper limit of 10 monitors. For more, a custom configuration app is necessary. Ten screens is probably overkill, however. (A three-, four-, or five-screen setup is enough for a mighty realistic game of Flight Simulator.)

The Multi-Monitor Resources Web site (www.realtimesoft.com/multimon) provides a bushel of news, FAQs, and troubleshooting tips. The site is from the publisher of UltraMon, software that adds additional multiple-monitor features to Windows, including the ability to span wallpaper across desktops and ability to run a different screen saver on each display.

If you lack the cash or desktop real estate to run multiple monitors, try a virtual desktop-management utility. Programs such as Cool Desk ($25; www.shelltoys.com/virtual_desktop) and MultiDesk ($25; www.siliconrealms.com/mdeskinfo.shtml) let you move windows to virtual desktops and quickly switch among them.

Depth Charge

Instead of investing in three displays, how about turning your single monitor into a 3D display? You can create stereoscopic images using your own digital camera (for viewing on the screen or using a low-tech handheld viewer), play 3D games, or gaze into 3D fractals and other trippy images. Check out stereoscopy.com for a list of PC, Java, and Mac apps for creating 3D images.

The hardware here includes special glasses that trick your brain into believing it is seeing depth on a flat CRT. That is, the glasses separate the screen's single image into two slightly different images, one for each eye. Two types of glasses are typically used for viewing 3D images on a PC. The cheap way is "anaglyphic" glasses, which use colored filters (typically red and blue or red and green) to create two images from a 2D source. These glasses are easy and inexpensive to make using photography filters.

The more expensive, techie-fun way is using shutter glasses. These use liquid-crystal lenses that are synchronized with the PC display to let only one eye see the screen at a time. The monitor and glasses quickly switch back and forth between two images. Such glasses are available from such manufacturers as iO Display Systems (www.i-glasses store.com) and VRex (www.vrex.com). CPU

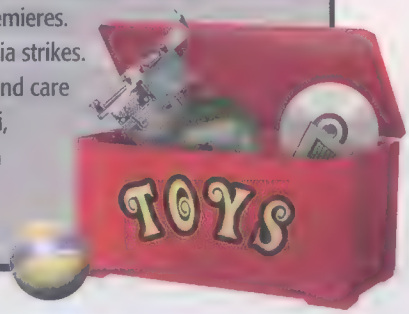
by Kevin Savetz

Infinite Loop

From Tyke To Hi-Tech

Kids' playrooms today look more like computer labs than nurseries full of teddy bears and action figures. For example, Oregon Scientific's B-Anything Inspiration Station resembles a tablet PC with interactive Barbie games. The move from tyke to hi-tech, though, has been anything but sudden.

1913: The Erector Set lets children be tiny engineers.
1963: Hasbro sells light-bulb heated Easy-Bake Ovens.
1967: Lite-Brite combines electricity and artwork.
1972: Magnavox sells Odyssey, the first video-game machine.
1983: Nintendo releases the NES in the United States.
1985: Teddy Ruxpin, the interactive, singing, storytelling teddy bear, premieres.
1986: Lazer Tag mania strikes.
1997: Children buy and care for Tamagotchi, the LCD pet on a keychain.



by Mike Magee

All Aboard For PCI Express

Teasing out just how PCI Express will affect the future of your PC is much harder than you'd think, despite the disclosures PCI-Sig has made. PCI Express is touted as the future for desktops, notebooks, and servers. The specs are nearly complete, and products will drop directly from the boughs of the vendor orchard in fall 2004.

On the face of it, these PCI Express serial apples will be good and sweet to eat—offering extra bandwidth for graphics and Ethernet connections and backward compatibility with the now-ancient PCI standard. If the vendors are to be believed, the "third generation" of I/O interconnect is a land of milk and honey.

There's no doubt that when DDR-2 memory is with us, along with 5GHz CPUs, 10 Gigabit Ethernet and the rest, the fabric of a PC will need a far better interconnect than PCI, although it has served us well for 10 years or more. The PCI standard was put together as part of a short-lived joint technical initiative between Intel and IBM; I visited the center they had in Boca Raton, Fla., before the spec was released. The engineers fancifully described the data paths after the network of street names that surrounded the Robert Noyce Center, named after co-founder of Integrated Electronics-Intel.

If you believe what the PCI-SIG and the vendors have to say, the high performance, highly flexible, highly scalable, hey, high everything about PCI Express is a natural evolution of PCI. There's far more to PCI Express than meets the eye of the beholder. An insider tells me the entire industry has realised that speeding up CPUs won't, of and by itself, persuade anyone but a tiny percentage of people to buy new PCs. And this, of course, is a huge problem for vendors. Up until the year 2000, it seemed that nothing could stop people from routinely replacing their PCs every other year. Then everyone started to wonder what the extra gigs were achieving. The killer app is harder to find than the Holy Grail, so laying out the extra dollars for a 3GHz rather than a 2GHz machine seemed an extravagance. Even games are struggling to keep up with the latest graphics cards.

It seems that around a year or so ago, just about every big player in the industry (including Microsoft, Intel, ATI, NVIDIA, hard drive makers, and the rest) met in some secret conclave and said something must be done. On the hardware side, that's PCI Express, which more or less rips up the ancient PC blueprints and starts again.

Hardware is just one element of the cunning plan, whispereth the mole. Microsoft could rewrite its operating system using new ground rules, to take advantage of the additional features PCI Express offered. So the higher graphics speeds, interconnection speeds, plus some comprehensive new eye candy from Microsoft would be so compelling that dullards who wouldn't upgrade, would, err . . . be compelled to do so.

So wave goodbye to AGP, PCI, and PCI-X; prepare to meet the brave new PCI Express world.

Microsoft's next-generation operating system client, code-named Longhorn, will arrive to take advantage of the additional features, and its launch will be synchronised to chime with the introduction of the hardware. The software, hardware, drivers, and BIOSes will all be brand spanking new. A few bones will be thrown to the legacy market and new desktop PCs may possibly have a PCI slot or two for a couple of years. The components and the silicon will be brand spanking new, as well, with board changes, connector changes, and circuitry changes also necessary. Motherboard sizes will change, and every form factor will be affected.

So wave goodbye to AGP, PCI, and PCI-X; prepare to meet the brave new PCI Express world. You will have little choice but to follow this route. At the Intel Developer Forum in San Jose in February, the different players in the PCI Express arena attempted to push the evolutionary rather than say the new technology is really revolutionary. Make no mistake: This is a revolutionary change for the PC market, right across the board. The technology has the ability to scale to 100Mbps and more, so everything will be faster. That's very exciting news, but it's also a bit scary. PCI Express will be a serial killer. ■

Want to dish some dirt? Write to Mike@cpumag.com.

Mike Magee is an industry veteran. He cut his teeth on ancient products like the Dragon and the Japanese PC platforms long before the IBM-PC won. He worked for a corporate reseller in the mid-'80s and saw the Compaq 386 sandwich box and every GUI known to humankind. Mike decided that the way to go was the Interweb around 1994 after editing PC mags in the late '80s and '90s. A co-founder of The Register, Mike started the chip-driven INQUIRER (www.theinquirer.net) in 2001. He has contacts from top to bottom in the business, spanning the entire chain, who help him root out interesting rumours and speculation.

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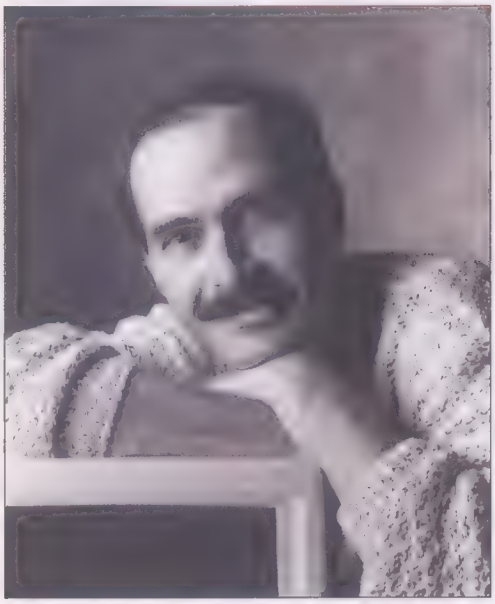
Technically Speaking

An Interview With Steve Gibson, Internet Security Guru & Doomsayer



Pick your descriptor: Genius. Paranoid. Philanthropist. Geek. Steve Gibson, president and founder of Gibson Research Corp., has dedicated his life to inventing solutions to technological problems. Perhaps you're one of the more than 18 million users who have used his free ShieldsUP! port-probing utility at http://grc.com to see if your PC is moderately safe from hackers. Despite being a programming whiz, Gibson is also eloquent and outspoken about the dangers of technology. Few people have his grasp of security issues, which is probably a good thing, because what Gibson knows and shared with *CPU* may very well scare the hell out of you.

by William Van Winkle

CPU: How do you think we'll finally cure the spam problem?

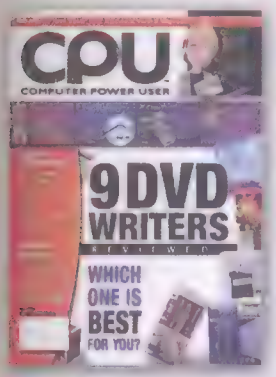
Gibson: I don't know whether it will be through legislation or technology. For example, I'm using a non-commercially available anti-spam tool that a buddy of mine and I put together called Spam Examine, and it works perfectly. I mean, in the last 2,362 pieces of email, there were two pieces of mail that the software thought were spam that I thought were good. So that's 0.08 percent false positives. There are a number of anti-spam tools surfacing that use a technique called Bayesian filtering. So this little gizmo of mine—actually, it's being written by Mark Thompson of AnalogX.com—will ultimately be freeware. . . . But I expect that all the email clients will shortly be getting these Bayesian filters, so people who care to sort their mail manually will soon find that it's sorting itself and doing a very good job.

CPU: For years, the press and antivirus companies have preached: Keep your antivirus software current and don't run strange attachments with unsafe extensions. And yet, millions of people still get hit with this stuff. Why?

Gibson: It's a reflection of the frontier era of the Internet—the fact that it's all so new and hasn't been worked out yet. The whole hacker, virus, Trojan problem, it's people screwing around with the network because they can, taking advantage of the fact that the connectivity of computers is very recent compared to the age of most software. Windows, for example, was created well before this Internet phenomenon. As a consequence, it wasn't designed with any inherent regard and appreciation for the security implications that go along with connecting all computers to all other computers. Now, we've got cell phones, which are digital and have address books in them, and there are cell phone viruses that steal your address books from your cell phone. There's like this headlong rush to connect everything together without a mature appreciation for the downside.

CPU: Think about these sweeping platforms, such as .NET, that aim to connect everything and control an increasing part of people's daily activities.

Gibson: It's going to be a disaster. I mean, nothing that I've read about .NET sounds or is essentially different from anything previous. You know, ActiveX is just Microsoft's OLE technology, which they couldn't sell when they were calling it OLE, so they renamed it ActiveX because that's a sexy-sounding name. .NET is Microsoft failing to take over Java, so they're going to do their own version and call it C Sharp and create a next-generation platform. It'll have its problems just like all the prior-generation platforms, and it'll have exploits. It's just more of the same.



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CPU: Does this relate to cyber-terrorism? If we have these large data infrastructures based on buggy platforms, what does that mean to us from a cultural and social security standpoint?

Gibson: That's a great question. And the question is not, "could the Internet be taken down?" I could take it down today, and so could anyone who really understands how it operates. It's a simple thing to do. There are millions of machines out there running Windows 2000 with either no password or simple passwords. They have an exposure to NetBIOS that allows anyone to log onto them. There are tools now that create NetBIOS worms that install in all these Windows 2000 machines. And there are enough of those now under central control to take down the DNS servers on the Internet. What's lacking is not the ability. It's just that there's no particular reason to. Code Red aimed at the White House, but it was a very weak attack on a specific IP, and as soon as it was known, they changed the IP. Well, if it had been attacking the white house.gov domain name—that is, looking up the domain on the fly—as it easily could have, then the whitehouse.gov domain would have been in real trouble. But none of these worms seem to have any interest in doing any true damage. They just exist for the sake of existing.

The danger we're in is very substantial because all we're missing from this scenario is the intention to do damage. Nobody seems to have it, so far. The trouble the Internet was under from the SQL Slammer worm was purely a consequence of the fact that it was just reproducing so frantically that it created local bandwidth outages wherever it had infected machines. But it was easy to block because it was using a specific port that we could do without. But there is an inventory right now of remotely controllable bots that could easily bring the Internet down if anyone wanted to aim them at our root DNS servers.

CPU: If these problems are so self-evident and the knowledge and tools to be able to exploit them are so readily available, why haven't terrorists done this already? And why hasn't the government corrected it?

Gibson: OK. First, I don't think terrorists care about inconveniencing people who want to go to a Web site. The fact is that flights were cancelled, ATM machines refused to dispense cash. All kinds of ancillary effects were caused by this SQL Slammer worm. So we already saw infrastructure that was dependent upon the Internet get caught off guard. That's only going to happen increasingly in the future. But I think terrorists want dead bodies. They want the kind of horror that was visited on us Sept. 11. I don't think cyber-terrorism is of any interest to terrorists because there's no way to target specific entities. It's a global phenomenon if you hurt the Internet. Now, the script kiddies and the hackers who have these bot armies, they blast the RIAA for endorsing the Berman bill, and sure enough, the RIAA is off the 'Net for weeks. The FBI gets involved. The RIAA is embarrassed and upset. But the fact is any time hackers want the RIAA Web site to be off the 'Net, it's off the 'Net. That could be Amazon.com. That could be eBay. It could be anybody who pisses these kids off. And there's nothing anyone can do—not even the FBI.

CPU: You're making us really insecure.

Gibson: You can imagine how I feel because I've been so vocal and proactive about this stuff. I mean, I've been under constant and varying attacks for the last couple years. I'm working on developing some solutions for the problem, but it's extremely difficult, plus it's merely a matter of scale. I can raise the fence to be immune to smaller attacks but not larger attacks. The problem is that the Internet was never designed to be attack-resistant. Back 20 years ago, no one dreamed that teenagers were going to have computers hooked to their network, so there was no security designed into the fundamental architecture of the Internet. None. That's why it's a trivial matter to abuse it.

Now we've got a global infrastructure that is completely insecure. There's no security possible that can be put into this network. I'm not kidding. I mean, I designed this stuff. I write these protocols, and it isn't possible. We've rushed headlong into this because email *could* be done, because the Web *could* be done. So, do I think connecting everything is a bad idea when I hear that ATM machines don't work if the Internet is in trouble? Yes.

CPU: So if we were enterprising hackers who wanted to burglarize our neighbor's place when he was on vacation, we'd just find who does his security, launch a DoS attack on his alarm provider one night, put on some gloves, and help ourselves?

Gibson: Yep. And in fact, if you were a criminal organization that wanted to do more than that, you'd find out from a disgruntled employee all the customers of a given alarm-monitoring location. You then put them in a denial-of-service attack, which is simple to do these days. Or you pay a hacker, to who has an existing bot network that is normally attacking his buddies, to blast them off an IRC because they all play king of the hill with their bot armies. Normally, they don't aim these potent tools anywhere specific, but you can imagine that if someone approached them and said, "Hey, kid, I'll pay you $10,000 to attack this IP address at this time for eight hours," the kid's going to say, "Hell, yeah. No sweat." So this alarm-monitoring company is now off the 'Net and unable to provide any monitoring services for any of its clients. Meanwhile, a synchronized burglary of all of its clients is perpetrated and no one knows. That'll happen within three years. I guarantee it's going to happen.

CPU: How do you sleep at night?

Gibson: I just, uh . . . well . . .

CPU: We're looking for a little hope here.

Gibson: There is none. All I can do is work to raise the level of people's awareness of the problem.

To read our entire interview with Steve Gibson, subscribers can go to www.cpumag.com/cpumay03/gibson.

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Under Development

A Peek At What's Brewing In The Laboratory

Fresh from the most influential R&D labs around the world, here's a glimpse at some of the technology that scientists, lab techs, and researchers are cooking up for the future.

More Than A Bit Of Your Life

In 20 or 30 years, you and your spouse will find yourselves engaged in the timeless argument that starts with, "Why, I remember when. . . ." That will follow with the other spouse interjecting, "No, dear, that's not how it happened at all." If the work of Gordon Bell, Jim Gemmell, and others at Microsoft's Media Presence lab bears fruit, the disagreement will be solved in seconds. The answer will be waiting on your network.

Virtually every piece of paper-based media in Bell's life has been digitized and poured into a SQL Server and Index Server database called MyLifeBits. Photos, videos, work documents, email—everything that can be digitized—is now annotated and searchable. All of Bell's phone conversations are going into the mix, as well.

The concept behind MyLifeBits is rooted in a concept called memex, detailed by visionary Vannevar Bush in a 1945 *Atlantic Monthly* article. The chief roadblock to memex has been storage. But now, as the team points out in a recent paper, "MyLifeBits: Fulfilling the Memex Vision," terabyte-capacity drives will cost less than $300 within five years. Archiving all the media that crosses through one's life is now feasible, provided an effective organization system is devised.

The Microsoft team staunchly maintains that traditional methods of hierarchical organization must go. Instead, a thorough system of links and annotations detail the background and content of individual media items and join them together in searchable relationships. MyLifeBits displays search hits using several methods, each of which has its advantages depending on the situation at hand.

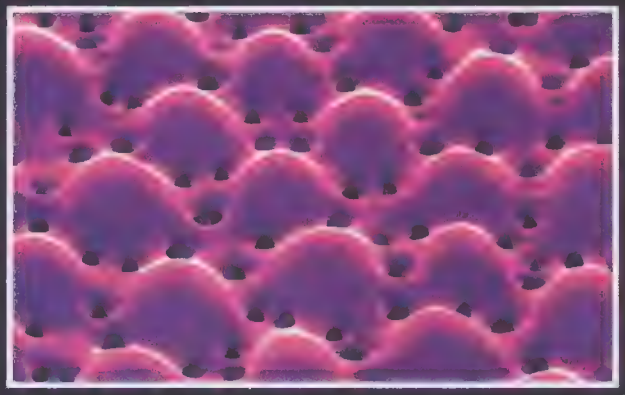
For example, a timeline view based on the word "Valentine" would return all hits with that word in their metadata laid out on a timeline, which could help locate an image you know was taken on Valentine's Day in the 1980s. A clustered view can return similar thumbnails sitting in front of other thumbnails linked to the primary hits. Rest your mouse over a thumbnail, and it will gradually expand without further clicking for viewing with greater detail. The researchers are now playing with Microsoft's text-to-speech engine so annotations can be quickly spoken rather than typed.

"Users will eventually be able to keep every document they read," writes the group, "every picture they view, all the audio they hear, and a good portion of what they see." ▲

Building Brittle Eyes

Like macroscale electronics, nanoscale electronics need precise lenses for certain functions. Unfortunately, most lenses start as a large piece of glass that's ground down to the desired size. As these lenses shrink down to the micro- and nanoscales, tiny imperfections become crippling flaws.

Enter the brittlestar, a cousin of the starfish. Two years ago, Bell Labs researchers, headed by materials scientist Joanna Aizenberg, discovered that the brittlestar's exoskeleton is riddled with calcite crystals that act as lenses for the creature's singular, compound eye. Aizenberg found that each crystal is generally free from many of the impurities that plague conventional lenses.



This image shows a scanning of an electron micrograph image of part of the skeleton of a brittlestar, composed of a single calcite crystal. Bell Labs scientists have created similar crystals in the lab for applications in nanotechnology.

"Sea organisms, such as the brittlestar, know how to make tiny, defect-free crystals at the temperature of sea water," says Bell Labs spokesman Saswato Das. "Crystals patterned at the micron scale or smaller and integrated into optoelectronic circuits are important components in various electronic, sensory, and optical devices. This is nature devising an elegant solution to a very complex problem, and learning from nature could be important to nanotechnology as we can learn how to make smaller, defect-free crystals in a potentially cost-effective way."

Most man-made microscale crystals are now made under extreme (and extremely expensive) temperatures. Assembling calcite particles in such a way that each crystal contains complex microscopic patterns makes brittlestar crystals. Aizenberg's team has created calcite crystals measuring only one-twentieth of an inch across, with patterns less than 10 microns wide. This practice of copycatting natural methods is known as biomimetics. ▲

by William Van Winkle

NEC's Entanglement In Quantum Computing

Even the *basic* fundamentals of quantum computing are difficult to explain, but in case you're new to the field, put your rational brain on hold and pretend you have a computer that processes with quantum particles rather than transistors. A transistor exhibits one of two states, represented as a 0 or 1. Qubits (quantum bits), however, have a property called spin. They can spin one way or the other, which can convey the value of 0 or 1. What makes qubits really weird is that they can also be both values simultaneously—if you don't look at them.

This two-in-one state is called superposition, which has the upside of allowing computations on all possible inputs simultaneously, a state known as quantum parallelism. The number of parallel operations processed in a cycle doubles with each qubit added. This mode of computing doesn't lend itself well to photo editing or playing Doom, but it's wicked fast for figuring out massive mathematical problems, such as breaking cryptographic keys.

Superposition's downside is its fragility. A single photon, such as one bouncing off the particle and into your eye so you can observe the qubit, is enough to bump the particle out of superposition and into a definite spin state. The challenge, more or less, is to see the qubits without seeing them. Get it?

NEC demonstrated the first solid-state qubit in 1999, but many problems were left on the path to a workable quantum computer. The first was how to measure particles without actively measuring. Another was how to manipulate groups of particles. Many researchers feel another quantum phenomenon called entanglement is the answer. Entanglement involves the coupling of qubits, such that multiple particles behave as one entity. A reversal in one particle's spin instantly appears in the other(s), even though there's no physical connection between them. Unfortunately, quantum entanglement has had only very limited success in the laboratory, and the feasibility of having solid-state quantum particles was somewhat theoretical—until now.

NEC and Japan's Institute of Physical and Chemical Research (RIKEN) recently announced the first successful quantum entanglement in a 2-bit solid-state device. NEC feels the development is a significant step on the road to full-blown quantum computers. The company doesn't expect to see such machines until at least 2020, however. ▲

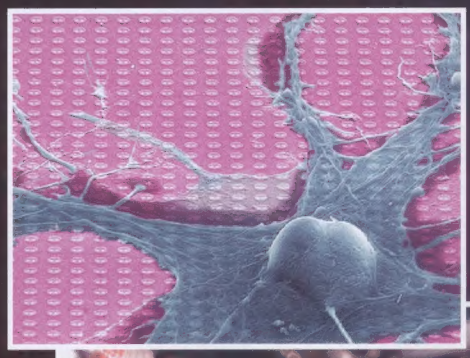
This Is Your Brain On A Chip

Right now you're using your brain to read. Researchers at Infineon Technologies AG in Germany have devised a semiconductor technology that can read your brain.

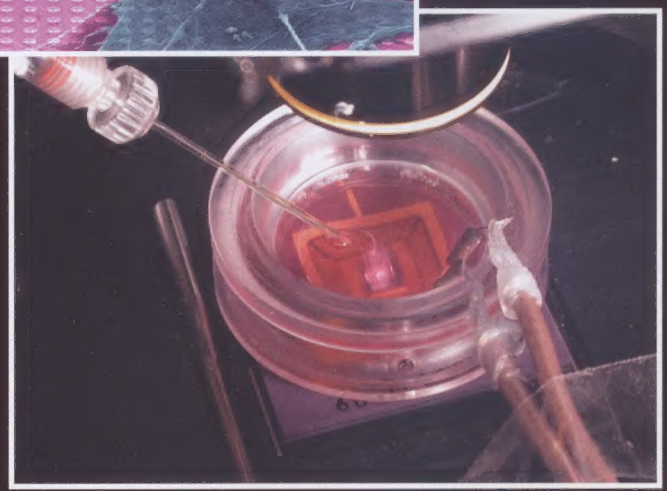
The new Neuro-Chip, at roughly 1 square inch, contains an array of 16,000 sensors that can detect and monitor electrical activity in cells. The cells are suspended in a nutrient-rich solution to keep them alive, then coated on the chip. Along with his team in Munich, Dr. Roland Thewes, senior director responsible for biosensor chip activity in the Corporate Research Center at Infineon, proved that the chip worked by recording electrical signals passed among the neurons in snail brains. Infineon hopes the technology will aid scientists in better understanding how the brain functions and reacts to different drugs. Working by contact alone, the CMOS chip offers numerous advantages over the closest contemporary approach, which now involves sinking microscopic needles into cells.

"With this development," says Thewes, "scientists have a completely new type of tool to study how nerve cells communicate and how nerve tissue reacts to different types of chemical compounds. The technology will bring new knowledge to science and, ultimately, can help to create new types of pharmaceutical treatment. But predicting specific future developments would be like trying to predict how the first integrated circuits invented 50 years ago would change the computers in use at that time."

Looking forward, the leap from sensing electrical impulses to administering them, such as for control over certain cell-group functions, is not an unpredictable one. However, Infineon representatives are quick to quash the idea, noting that no one (officially) "has thought about whether you could signal the cells to do one thing or the other." ▲



The microscope makes visible the sensor array and circuitry of Infineon's Neuro-Chip. Neurons are placed on the sensor array for further study.



The Neuro-Chip is connected with a living nerve cell. The Neuro-Chip's 16,384 sensors read the electrical activity of the cell, with the typical size of neurons being between 10 to 50 micrometers.

Q&A With Gabe Newell

As the founder and managing director of Valve, the developer behind such titles as Half-Life and Counter-Strike, Gabe Newell has what many would consider to be one of the best jobs in the world. He earned his position the hard way: 13 years at Microsoft. A man with as much humor as vision, Gabe Newell generously granted *CPU* a rare interview over the course of several email exchanges.

Q You were the product manager for the first two versions of Windows, the two that had to get cycled through before the public loved Windows 3.0. Was this a frustrating experience?

NEWELL: Actually, I ran program management for Windows up until Jody Snodgrass took it over midway through version 3.0. It was an enormous amount of fun being part of that team. The people working in the Windows group were some of the best programmers I've ever worked with, and we all had a sense that we were doing something that was going to be hugely positive for software developers and for users. It was a very different feeling from what the work environment at Microsoft has become over the last decade.

Q What personal experience with Bill Gates is most firmly printed in your brain?

NEWELL: My most memorable experience with Bill isn't really about Bill so much as it is an anecdote about what a dillweed I used to be. At a party, I asked him why he didn't name the company Huge And Hard rather than Microsoft. Aaagh. It still makes me cringe.

Q Tell us a little about the early days of Valve. How did you start it, and what was your mission?

NEWELL: We were total gooberheads. Our office space was cement floors with power

cables coming down out of the ceiling and six of us sharing a dial-up connection to the Internet. Some of the publishers, like Broderbund, basically laughed us out of their offices when we told them what we wanted to do. The main thing we had going for us was really smart people and a clear idea of what we thought was a better direction for first-person action games.

Q What was that better direction?

NEWELL: Most companies building FPS at the time were thinking that an FPS reduced to a shooting gallery. We thought that there was a huge opportunity for story telling and creating an immersive world. Great action movies aren't one continuous fight, and the same was true for action games.

Q If you set out to design the perfect game console platform, how would it differ from what's on the market now?

NEWELL: It would boot off of the 'Net and not have any removable storage. Hard drives and 'Net connections are good; DVD players are bad.

Q Will conventional screens and speakers keep us content, or how do you envision gaming becoming a richer sensory experience?

NEWELL: This is the kind of industry change that really requires a visionary on the content side to drive. If you look back, it's amazing the number of changes in the industry that John Carmack single-handedly forced to occur. These transitions, like force feedback, will occur when someone shows the other developers why they will have to take advantage of it to be competitive. The change has to occur in the gameplay space and not the presentation space. In other words, the game has to be better, not just bumps in the road having a physical element.

Q Looking four or five years down the road, what do you hope that AI bots will facilitate in games that can't be reasonably achieved today?

NEWELL: High-level goals in AI tend to get people in trouble, as they miss the kind of pragmatic, low-level stuff that AI is actually good at. But with that caveat, I'll jump off a cliff and say 'a persistent character that is a better daily companion than all pets and some of your friends.'

Q Either that's some amazing programming or I need better friends.

NEWELL: I'm not sure you meant to use the word 'or.'

Subscribers can see www.cpumag.com /cpumay03/newell for the full interview.

William Van Winkle began writing for computer magazines in 1996. He was first published in 1990, the same year he took his first job in computers. He and his family live outside of Portland, Ore.

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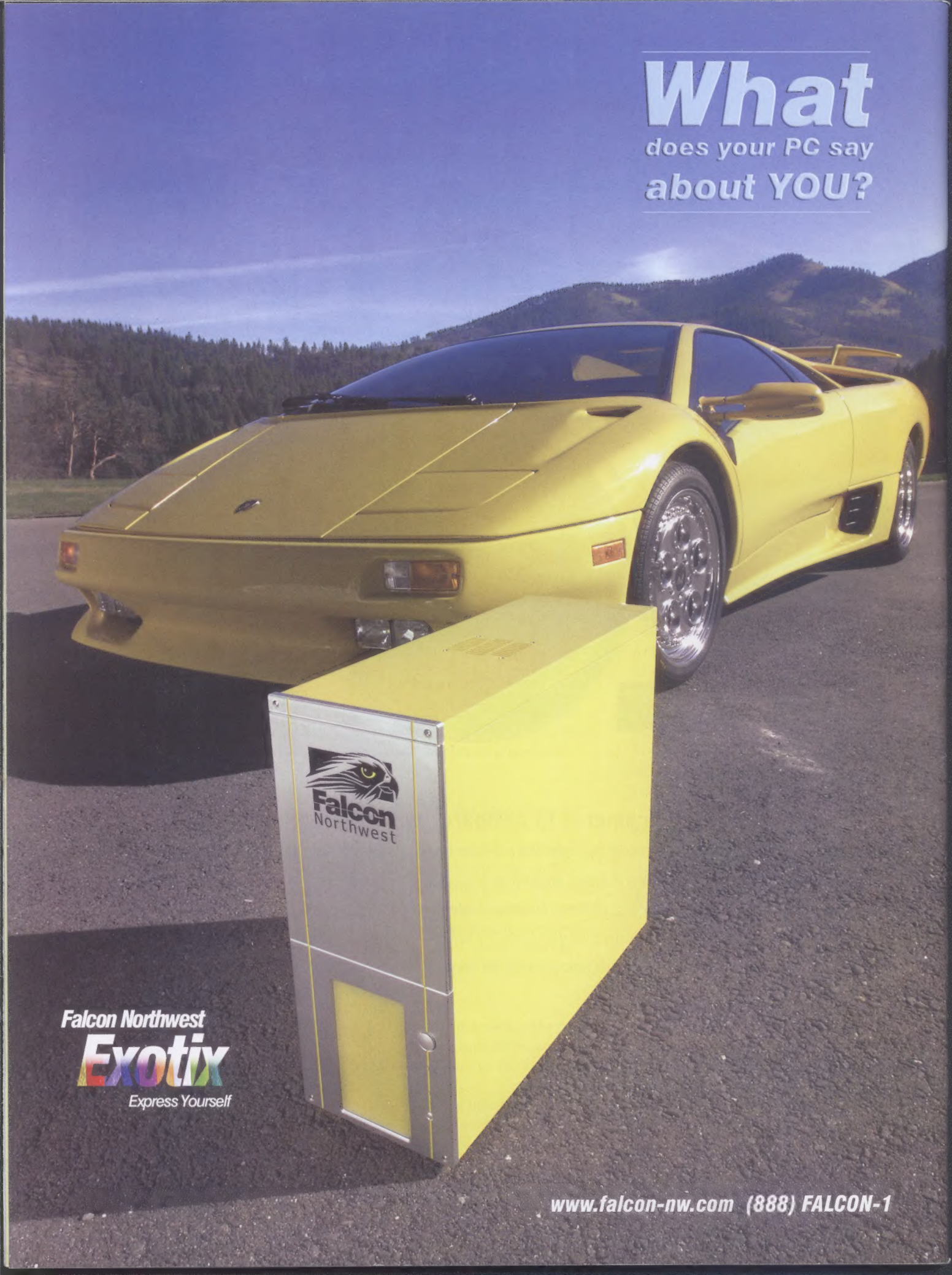
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